XML DATABASES

New DBMSs use XML as their native format, eliminating much conversion and processing. Page 80
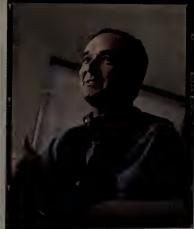
COMMUTING HELL

In some of the top IT markets, the trip to work is sure to drive you insane. Page 60

DOT-NOTS PULL AHEAD

Traditional companies suddenly find themselves beating out dot-coms in the recruitment war. Page 93

COMPUTERWORLD

KEVIN HICKEY was hired to clean up the IT mess at Oxford Health Plans

TRACEY KROLL

TOP 10 DISASTERS

TRIPS, PULSE, CONFIRM. They're great names for IT projects, but they were absolute disasters that caused multimillion-dollar losses for the companies involved. For our special report, Kim S. Nash examined the records — and pending lawsuits — to identify the Top 10 corporate IT disasters and figure out what went wrong. The problem is, IT shops rarely learn from their mistakes, so they're bound to happen again. **First of a two-part series.**

NEWSPAPER

STUDY: H-1B CRUCIAL TO ECONOMIC GROWTH

Report for Congress supports use of foreign workers, is inconclusive on age bias claims

BY JULEKHA DASH

A report released by the National Academy of Sciences last week supported the industry's use of foreign worker visas in a tight labor market and found no definitive evidence of age discrimination in information technology.

The 15-month study, commissioned by Congress, also called for broader education initiatives to train the domestic workforce.

"We risk not allowing the economy to grow at all if we don't have workers with the right kinds of skill sets avail-

LABOR CRUNCH

able," said Sandra Boyd, chairwoman of American Business for Legal Immigration, which represents high-tech firms.

Boyd said the coalition supports the NAS report's recommendations for better education and training, as well as the decision by Congress earlier this month to double the H-1B visa fee to $1,000 as a means of funding high-tech training programs.

The NAS committee, which included academics, policy researchers and private-sector employees, based its findings on oral testimony from more than 100 IT workers, employers and government agencies, as well as input submitted to its Web site. Congress asked the Washington-based NAS to investigate high-tech workforce needs and allegations of H-1B abuse and age discrimi-

CA PRICING GOES SUBSCRIPTION

Analysts: It won't make any difference to users

BY JAIKUMAR VIJAYAN

Old wine in new bottles: That's the reaction from analysts to a subscription-based software-pricing scheme announced last week by Computer Associates International Inc.

Under the new approach, users will be able to buy CA products via a monthly subscription instead of having to license specific packages for multiyear periods averaging from three to five years.

CA officials said the subscription-based sales model will let users vary the mix of software they use as their business and technology needs

UNWITTING VOTERS PUT ON THE MAP

Parties meld databases to target their messages

BY MITCH BETTS

The PC-based GeoVoter system in Darryl Howard's office is getting a workout before next week's elections. As executive director of the Oregon Republican Party in Salem, Howard is a leading-edge user of database and mapping technology that helps candidates deliver personalized campaign messages to individual voters.

"I'll give you an example," he said. "A Democratic candidate yesterday said he'd like to tax SUV owners. Our [Republican] candidate will drop a mail piece in the next few days based on the fact that I can tell you everybody who owns an SUV who's a registered voter in that district."

In other words, the mailings

will go only to those 3,600 sport-utility vehicle owners, so there's no wastage. "All politics is not local. All politics is *personal,*" Howard said.

Political campaigns have mined voter-registration and census data for decades, but now they're adding demographic data about such things

USER GROUP AT ODDS WITH ORACLE

Vendor seen favoring its own conference

BY MARC L. SONGINI
HONOLULU

The noticeably limited presence of Oracle Corp. at last week's Oracle Applications User Group conference here had members upset by a lack of support and resources from the

company and concerned this could weaken a major independent forum for users.

Oracle last spring offered to sponsor the OAUG conference, but members rejected

OAUG President Jeremy Young

When It Comes T
eTrust Can Prot

It's that sinking feeling in your stomach. That look your face makes every time you read a story about a disastrous corporate security breach. It's that nagging fear that won't go away no matter how many times you tell yourself there's nothing to worry about. Because there is, security is the number one concern of every IT professional for good reason. The good news is that there's a proven solution you can trust.

Without Bullet-Proof Security, Successful eBusiness Is Impossible

The only thing bigger than the opportunity that comes with putting your business on the Web is all the risk that goes with it.

Undetected attacks can strike at any time, from anywhere, in a mind-boggling variety of forms. Most sites can't even track every attempt. And new threats are developed every day, all over the world.

Without the right protection, eCompanies risk losing everything: data, customers, revenue, and more.

A Simple Solution To Your Most Complicated Challenge

Online business through eCommerce, corporate intranets, partner-to-partner transactions on extranets and websites, as well as their supporting enterprise-wide assets — all need to be secured. Protecting the integrity and availability of intranet information is critical to all organizations.

Web-enabled business applications open up all of your back-end and legacy systems to the world.

Unfortunately, in the race to become Web-enabled, security has taken a back seat. IT managers often give themselves a false sense of security with a standalone or partial security solution. They forget that security is only as strong as its weakest link and that eCompanies need an integrated and comprehensive security solution that provides best-of-breed functionality.
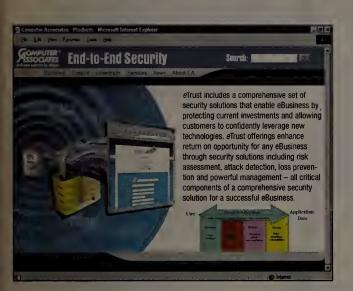
eTrust Security Suite
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- Directory
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FROM PRACTICE TO PRODUCT

IT consultants who want to leave a lasting legacy can transform their practices by launching their own development products. But as David Sims learned, the risks can be as g/ c # a the rewards. Page 62

ANNE SHERWOOD

LET THERE BE LIGHT

Digital optical computing will be in the guidance systems of satellites first, NASA's Donald Frazier says, but earthbound applications won't be far behind. Page 78

DENNIS OLIVE

COMPUTERWORLD THIS WEEK

OCTOBER 30, 2000

AT DEADLINE

Hackers Penetrate Microsoft's Network

Microsoft Corp. last week confirmed that its internal computer network was hacked by malicious attackers who were able to view portions of the source code for key products such as Windows and Office.

The incident, which security experts said could potentially have serious repercussions for Microsoft, was discovered by the company Oct. 25 and reported to the FBI the next day, said a Microsoft spokeswoman. The attack, which was being investigated by the FBI at deadline, is believed to have been initiated in St. Petersburg, Russia.

The spokeswoman said Microsoft was "very confident" that none of its source code had been changed or manipulated by the attackers.

Graham Cluley, a security expert at U.K.-based security software vendor Sophos PLC, said the attackers appear to have used a worm known as QAZ to break into Microsoft's network, although he noted that reports vary about whether Microsoft has confirmed that fact.

Cluley said an attacker wouldn't "have to be a genius" to use the worm. But Ira Winkler, a security analyst at Internet Security Advisors in Severna Park, Md., said the Microsoft hack "appears to be a very complicated and successful attack." The attackers "did a lot of work to do this without getting detected" for a period of several months, Winkler added.

Eric Hemmendinger, an analyst at Aberdeen Group Inc. in Boston, said the attack is ironic because many Microsoft applications have included unintentional security holes, leaving users vulnerable to attacks by virus writers. The tables "appear to have been turned on Microsoft here," Hemmendinger said.

Mikko Hypponen, antivirus research manager at Finland-based F-Secure Corp., said in a statement that QAZ makes it relatively easy for outsiders to access confidential data. "We've been forecasting that worm-based industrial espionage would happen for quite some time, and it looks like now it has happened big time," Hypponen said.

– Todd R. Weiss and Linda Rosencrance

MORE ONLINE

IT Leaders Ho-Hum On AT&T Breakup

Don't foresee immediate change in service

BY JAMES COPE AND BOB BREWIN

CORPORATE network managers don't expect any immediate, substantive changes in service from AT&T Corp. as a result of the company's decision last week to split itself into four parts.

The new AT&T Business unit, focused on enterprise communications for large corporate customers, will be the core of the balkanized operations. In addition to providing service in the U.S., AT&T Business will continue to hold a 50% interest in Atlanta-based Concert Communications Co., the international communications services joint venture AT&T set up with London-based British Telecommunications PLC.

Douglas Fields, vice president of the telecommunications unit of United Parcel Service of America Inc., said his company would "expect to see business as usual with AT&T" in the near term. Atlanta-based UPS is a large user of AT&T long-haul networks, as well as services provided by the company's AT&T Wireless unit.

Robert Krestakos, director of information services at Steelcase Inc. in Grand Rapids Mich., which uses AT&T services, also said he's unconcerned about the restructuring. "We really haven't spent much time looking at it," Krestakos said.

Move Makes Sense

Carl Wood, a data communications manager at Tyson Foods Inc. in Springdale, Ark., said the corporate focus makes sense because AT&T isn't "getting any margin" out of its consumer business.

Analysts said the dramatic corporate overhaul reflects Wall Street dissatisfaction with the efforts of AT&T Chairman Michael Armstrong to capitalize on supposed synergies among the company's wireless, cable TV, consumer long-distance and enterprise operations. As a result, they said, Armstrong had little choice but to split the company into four stand-alone entities: AT&T Business, AT&T Broadband, AT&T Consumer and AT&T Wireless.

'Foolish' Expectations

Ken McGee, a fellow at Gartner Group Inc. in Stamford, Conn., said he remains convinced that "Armstrong had the right strategy, but the market and [Wall Street] analysts imposed foolish and irresponsible expectations on the company, when AT&T could have transformed itself from a commodity provider to a provider of extraordinary value."

Brownlee Thomas, an analyst at Giga Information Group Inc. in Cambridge, Mass., said she disagreed.

She said Armstrong failed in his attempt to "re-create AT&T in its original form to be everything to everybody."

The goal, in part, was to be able to provide a variety of bundled services to business users. But AT&T had grown so large, it became hard to effectively manage all of the company's different parts, according to Thomas.

Although some cable systems vendors have started to provide high-speed service for business customers, AT&T's decision to spin off its broadband operation into a separate business unit doesn't reflect a major switch in the company's consumer-oriented broadband strategy, since cable data service has just started to penetrate corporate America, analysts said.

Nicholas Economides, a professor of economics at New York University's Leonard N. Stern School of Business, said corporate data customers account for a "very small part of the primarily residential" cable TV business AT&T has spent more than $100 billion to acquire and develop in the past three years.

Mark Liggio, an analyst at Allied Business Intelligence Inc. in Oyster Bay, N.Y., said spinning off the cable operation should free AT&T from "a distraction" that ate up resources as well as management's time. ▶

ANALYSTS say AT&T's Armstrong had little choice but to split the company into four parts

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Companies Dynamically Allocate Bandwidth

ATM switch precludes need for more leased lines

BY JAMES COPE

Rather than add more leased lines and expense to his company's wide-area network, Robert Krestakos this week is installing a network that squeezes more from the bandwidth he's already paying for.

Krestakos is the director of information services at office equipment maker Steelcase Inc. in Grand Rapids, Mich.

He's in the process of implementing an Asynchronous Transfer Mode (ATM) system that dynamically allocates the bandwidth available through an existing frame-relay connection.

Currently, Krestakos' WAN connects corporate headquarters to 22 regional sales offices and four manufacturing facilities. The WAN is statically divided by application — which means that at any given time, bandwidth set aside for one application may be underutilized while bandwidth allocated for a different program may be inadequate.

To remedy this inefficiency, Krestakos is implementing and installing a network system and adopting service from AT&T Corp. called Integrated Network Connection Service (INCS).

Krestakos said the system is based on an ATM switch from San Jose-based Cisco Systems Inc. that AT&T installs on the corporate premises.

Giving to the Needy

The ATM switch, which can also accommodate IP traffic, dynamically allocates available bandwidth according to which application needs the bandwidth at the time, Krestakos explained.

David Ellis, vice president of information systems at The Home Depot Inc. in Atlanta, has been using the INCS system for several months. He used a railroad analogy to describe the difference between Home Depot's previous standard frame relay system and INCS. Previously, bandwidth on Home Depot's network, which connects more than 1,000

STEELCASE is installing a system to improve bandwidth performance on a WAN connecting 27 sites

NEWS

Focus Shifts to Unix as IBM Rivals Quit Mainframe Market

Departures of Amdahl and Hitachi change market dynamics at high end

BY JAIKUMAR VIJAYAN

The impending exit of both of IBM's plug-compatible mainframe rivals from the mainframe market focuses more attention on the real battle for the high-end server market: the one between IBM and Unix server vendors, analysts and users said.

This month, Amdahl Corp. said it plans to quit the mainframe business because the cost of staying competitive with IBM's recently announced 64-bit systems wasn't worth the projected returns.

Amdahl's announcement came seven months after Hitachi Data Systems announced that it would stop selling mainframes to new customers and would, like Amdahl, focus on Unix systems going forward.

Their planned departures allow IBM to avoid hardware price reductions, especially in the higher end of the mainframe market that Unix servers don't scale up to yet, analysts said.

But growing competition from a new generation of powerful Unix servers from vendors such as Sun Microsystems Inc. and Hewlett-Packard Co. could temper IBM's moves in the lower end of the mainframe market, analysts added.

"I think that for the last couple of years, IBM's competition to the 390 [mainframe] was not coming from plug-compatible vendors but primarily from Sun and [other Unix vendors]," said Dan Kaberon, Parallel Sysplex manager at Hewitt Associates PLC in Lincolnshire, Ill.

That's because technologies such as partitioning, sophisticated I/O and workload management capabilities, as well as better processor and memory support, are pushing high-end Unix servers ever closer to mainframelike performance said Jonathan Eunice, an analyst at Illuminata Inc., a consultancy in Nashua, N.H.

"In terms of raw memory or storage or processor [support], Unix servers are, in fact, better than mainframes," Eunice said.

"The strong point for the mainframe is in handling integrated workloads where you need not only a lot of computing power but also transaction handling and I/O at very sustained rates," he added.

"Unix is in a very good position to expand from its midrange franchise," agreed Jean Bozman, an analyst at International Data Corp. in San Mateo, Calif. "Any workload can run on either a Unix server or a mainframe. . . . The difference really is the higher level of reliability and security available on mainframes."

And although Unix server hardware prices have been creeping ever closer to those of mainframe hardware, it still costs a lot more to run software on mainframes, analysts said.

Areas where mainframes still clearly hold the edge over Unix servers are in their ability to handle multiple workloads, the way their hardware and software are tuned to take maximum advantage of each other and their superior middleware as well as the overall maturity of the platform in enterprise environments, Eunice said.

Mainframe Growth Slowing

The growing sophistication of Unix servers comes at a time when mainframe server growth seems to be slowing. Stamford, Conn.-based Meta Group Inc. estimates that the net growth of installed mainframe capacity will be down to around 19% this year, compared with 33% last year.

"Up until about two years ago, the point where it become more cost-effective to run [an application workload] on a mainframe was about 500 MIPS. . . . Today it is close to 1,000 MIPS," said Carl Greiner, a Meta analyst.

As a result, "you have to be pretty big shop to buy a mainframe," said Greiner. "You are not going to find many new organizations and dot-coms looking at mainframes as an alternative." ▶

Server Schism:

MAINFRAMES ARE:

■ More mature in enterprise environments.

■ More stable and reliable than Unix servers.

■ Capable of handling multiple workloads much better than Unix servers.

BUT . . .

■ They are costlier to implement than Unix servers in most cases.

■ Most new applications are being developed for other environments first.

■ It's still too costly to upgrade mainframe capacity.

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stores to its headquarters, was allocated by applications such as video, voice or data, much like railroad cars that can carry only specific types of cargo, said Ellis.

At any given time, that can leave some categories of cars empty while others are full, Ellis explained. So instead of letting the train leave the station with empty cars — and some of the data left behind — INCS dynamically allocates unused capacity set aside for one application to applications that need the extra space — in this case, bandwidth.

Saving $10k to $20k Per Month

Ellis didn't comment on cost, but Krestakos said he expects INCS to save Steelcase between $10,000 and $20,000 per month over a comparable native frame-relay system.

Improving existing bandwidth "is another way that companies are trying to eliminate expense," said Ken McGee, a fellow at Gartner Group Inc. in Stamford, Conn. "It's the dawning of the age away from circuit switching and the utilization of packet technology, he added." ▶

Aviation Exchanges To Merge

BY TODD R. WEISS

Acknowledging their similarities, two new online aviation business-to-business marketplaces joined forces last week to create a larger and broader Web-based supply-chain powerhouse.

The announcement of the merger between Dallas-based MyAircraft and AirNewco in Washington continues a trend of consolidation between different Internet-based marketplaces within a single industry, analysts said.

Under a new but not-yet-determined name, the company will broker the purchases of aviation services and aircraft parts through a neutral business-to-business exchange for buyers and suppliers. The Washington-based business is scheduled to launch its Web site in next year's first quarter.

AirNewco was announced in April by six airlines and currently counts as members Air France, American Airlines Inc., British Airways PLC, Continental Airlines Inc., Delta Air Lines Inc., Iberia Airlines, Swissair, United Air Lines Inc. and United Parcel Service of America Inc.

MyAircraft, created in February, is a joint venture among aerospace suppliers including United Technologies Corp., Honeywell International Inc. and The BFGoodrich Co., as well as software vendor i2 Technologies Inc.

Jim Taiclet, president of aerospace services at Honeywell and co-chairman of MyAircraft, said the new company will help buyers and sellers better manage inventories and resources.

Open Invitation

"We invite and encourage other airlines and the business and general aviation world" to participate, Taiclet said. "[They] can certainly be customers that benefit from the critical mass that we'll be able to put together here." ·

Ari Bousbib, vice president of corporate strategy and development at Hartford, Conn.-based United Technologies, said the company will earn revenue through subscription and transaction fees.

Both exchanges faced competition from rival groups, including Aeroxchange, which is being created by a team that includes America West Airlines, FedEx Corp., Northwest Airlines Inc. and Oracle Corp.

Harry Wolhandler, an analyst at ActivMedia Research

Using the Same Runway

AirNewco and MyAircraft will combine to form a new aviation B2B Web exchange.

Participating companies include:

■ Air France

■ British Airways

■ Continental Airlines

■ United Technologies

■ Honeywell International

■ United Parcel Service

■ BFGoodrich

LLC in Peterborough, N.H., said the merger follows similar shakeouts in other sectors. In the automobile industry, Ford Motor Co., General Motors Corp. and DaimlerChrysler AG teamed to develop a single business-to-business exchange called Covisint. And in the construction industry, two of the largest online marketplaces, Bidcom Inc. in San Francisco and Cephren Inc. in Palo Alto, Calif., announced a merger of their own last week. Bidcom and Cephren will form San Francisco-based Citadon Inc. to strengthen their market position.

Such moves represent "a logical rationalization," Wolhandler said. "If there's overlap among both parties, then it becomes very natural."

Shawn Willett, an analyst at Current Analysis Inc. in Sterling, Va., said the joining of the two aviation exchanges "is an inevitable part of the process."

"The value of a marketplace is that everybody is participating in it," Willett said. "It just makes sense that it's going to be hard to have a lot of different marketplaces in this same vertical [industry]." ▶

Court Caves in on Idea of Tutor for Microsoft Case

Gives up on plan to hire computer expert after government, Microsoft air concerns

BY PATRICK THIBODEAU
WASHINGTON

THE U.S COURT OF Appeals last week dropped the idea of hiring a computer expert to provide basic computer instruction to the court in preparation for hearing an appeal of the Microsoft Corp. antitrust case. The decision came after the federal government and Microsoft warned that it might be almost impossible for the expert to maintain neutrality in a minefield of disputed technical issues.

The court evidently agreed with some of the concerns. In a one-sentence statement posted on its Web site late last week, it said that "upon consideration of the parties' responses ... the court has decided not to proceed with the review session."

Issues Raised

The appeals court earlier this month said it wanted to use Michael H. Hites, chief technology officer at the Illinois Institute of Technology in Chicago, as a tutor on basic computing principles as it sifts through the technical issues raised by the case against Microsoft. Legal experts said the move was well-intentioned and made sense. But in papers filed last week with the court, Microsoft and the government each raised concerns.

Microsoft said Hites could have easily crossed into contentious legal areas with seemingly simple explanations. The parties have "fundamental disagreements over issues that might appear to an uninitiated observer to be uncontroversial, such as the proper definition of a personal computer operating system, creating a risk that the review session will inadvertently stray into disputed topics," the company said in its brief.

Similarly, Hites would have had to avoid explicit discussion of issues raised in Microsoft's appeal of U.S. District Court Judge Thomas Penfield Jackson's ruling that the company broke antitrust law. He also would have had to steer away from background material "that bears closely on disputed issues," according to the U.S. Department of Justice (DOJ) and 19 states in their joint brief.

Microsoft, however, went a step further and questioned Hites' neutrality. His résumé, provided by the court, cites "a June 2000 project for Sun Microsystems entitled 'Unix Training in Community Development.' The nature and extent of financial support provided by Sun Microsystems for this project aren't disclosed," Microsoft said in its brief. James Gosling, a Sun executive, testified for the government during the trial.

But even strong supporters of the government's case said they were uncertain about the use of any expert witness.

"I'm concerned that the judge will rely too heavily on him; he is not a substitution for 77 days of testimony," said Ken Wasch, president of the Software & Information Industry Association, a Washington-based trade group that's backing the DOJ in its effort to break up Microsoft. Hites' influence on technology matters could have been such that he might have become, in effect, "an eighth judge," Wasch said.

But legal experts say a tutor could help the court. "This is an area where there are a lot of concepts for which there is no definitive text," said Joe Sims, a former DOJ antitrust official and lawyer at Cleveland-based Jones, Day, Reavis & Pogue. "Within the bounds of getting the thing done, the more input [the appeals judges] get, maybe the better."

The biggest challenge that court advisers and the judges face "is to keep these technology definitions objective and benign," said Hillard Sterling, an antitrust expert at Gordon & Glickson LLC in Chicago. "This gives the appellate judges a critical opportunity to have give-and-take on clarifying the technology products and the way they work together." ▶

FTC to Review Software Licensing Practices

UCITA causing problems for users

BY PATRICK THIBODEAU
WASHINGTON

Horizon Blue Cross/Blue Shield of New Jersey is located in a state that hasn't adopted the UCITA software licensing law. But a software vendor is adamantly insisting that Maryland's UCITA law, which was enacted Oct. 1, applies to a licensing contract it's currently negotiating with the Newark, N.J.-based insurer.

Arne Larsen, information systems director at the 5,000-employee insurer, said the situation with this vendor, which he declined to identify, is an anomaly among the many software licensing contracts the company is dealing with. But that's of little comfort, he added.

Support from Users

UCITA is "a one-sided law: It protects the software vendors; it does nothing for us," said Larsen. That's one of the reasons why he and other end users interviewed support the U.S. Federal Trade Commission's (FTC) decision to begin exploring software licensing practices, an effort launched at a two-day workshop last week.

The FTC is making a broad-brushed examination of common software licensing practices, such as whether the lack of disclosure of warranty terms until after a software sale is made is fair to end users. It's also exploring issues like whether embedded computer systems found in many products such as automobiles will have the liability-limiting warranty terms allowed by UCITA, formally known as the Uniform Computer Information Transaction Act.

Software industry representatives invited to speak at the workshop credited established licensing practices with giving vendors the flexibility to tailor software to end users' needs, such as those met by application service providers.

"There is no one-time sale. It is, in fact, an ongoing subscription relationship," said Mark Bohannon, general counsel at the Software & Information Industry Association in Washington.

UCITA, which has been adopted in Maryland and Virginia and has been sent to other states for consideration, sets a series of default rules in software licensing, allowing things such as remote disabling of software. Software industry groups, however, say that all UCITA allows is the freedom to contract. Companies can include or exclude whatever terms they like in a contract negotiation.

If the FTC "comes out strongly against it, which I hope they do, then that will be that much more to stoke the opponent fire with," said Randy Roth, director of corporate purchasing at Principal Financial Group in Des Moines, Iowa.

As Horizon Blue Cross/Blue Shield of New Jersey found, however, it doesn't matter where a vendor or end user is located for UCITA to apply to a contract. The vendor can still cite Maryland law as its "choice of law" in a licensing contract, no matter where the vendor and licensee are located, legal experts say.

Larsen said he believes the size of his organization will give it leverage in negotiations. But whether or not he deals with a company that wants UCITA terms will depend on how badly he wants the software. "If you need it, you need it, and then you just hopefully negotiate your way out of some onerous clauses in the contract," he said. ▶

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IBM Updates Talking Browser Software

IBM last week released the latest version of its talking Web browser software, aiming to give visually impaired individuals greater access to e-commerce operations and improved Internet surfing options. With Home Page Reader Version 3.0 software, IBM added JavaScript support to give users a smoother ride when cruising the Web. Past versions of the software often made buying or selling goods online difficult, IBM said. The JavaScript functions should ease the user's experience and lead to more consistent levels of transaction completion.

Trade Rep Champions Networked Economy

The U.S. will spend the next year championing a "networked economy" trade initiative, with the intent of ensuring that e-commerce has the same global marketplace access and protections as conventional commerce, said U.S. Trade Representative Charlene Barshefsky in a speech last week in Washington. One of the goals of the initiative is to ensure that goods sold digitally aren't at a disadvantage compared with identical products sold in brick-and-mortar stores. Other goals include more work toward elimination of tariffs, encouragement of investment in broadband infrastructures and a continuation of efforts to protect intellectual property.

Feds Persist in Using Cookies

The White House plans to review the information-gathering practices of government Web sites after a U.S. General Accounting Office (GAO) report said nine federal agencies are using persistent cookies, an action that may be in violation of a government prohibition on the use of cookies. The GAO identified nine agencies, including the General Services Administration, U.S. Forest Service and Office of Personnel Management, that use persistent cookies. In June, the White House said government agencies shouldn't use cookies unless they have a compelling need to do so.

EchoStar Builds Disaster-Proof SAN

Analysts call it a networking breakthrough

BY MICHAEL MEEHAN

FORGET about electronic greeting cards and downloadable video games. Echo-Star Communications Corp. has developed an internal network that transfers storage information using Internet protocols to its remote disaster-recovery facility.

Analysts say that the network is a breakthrough in mission-critical computing and that it could portend a time when all major companies merge their disparate storage-area networks (SAN) into a single unit using public telephone lines.

"Big companies have lots of locations, and they're managed as disparate elements," said Steve Duplessie, an analyst at Enterprise Storage Group in Milford, Mass. "If you can tie those into one network using Internet protocols and public phone lines, I think that's a fairly killer application."

EchoStar's Rick Nelson, senior information technology architect at the Littleton, Colo.-based satellite broadcaster, enlisted CNT Corp. in Minneapolis to build the network, which uses a custom-built "viaduct" to convert storage packets using SCSI and Fibre Channel protocols to IP packets.

Nelson began testing the network late last year over T1 lines. He said he intends to have the disaster recovery facility fully online in the early part of next year, using two DS3 lines to channel the data.

"There's a lot of effort to perform this type of migration, especially if you can't shut down production," he said.

The work required a complete overhaul of EchoStar's SAN as well as the hundreds of servers that feed information into it. The company now mirrors server data for near-line availability at its Cheyenne, Wyo., disaster-recovery site.

A Happy By-product

Nelson confirmed that the mirroring works as advertised and said one of the happy by-products of the system is that he can disconnect one machine without disrupting others in the same network. "Before this, even machines using different lines shared a single cache or buffer, and a single SCSI hiccup could shut down the whole system," he said.

Gary Johnson, vice president of SAN services at CNT, estimated that the average cost for a large firm would be $1 million to $2 million up front. Nelson fixed his return on investment at 14 to 15 months.

William Hurley, an analyst at The Yankee Group in Boston, said vendors have yet to develop products that encapsulate what CNT has built for Echo-Star, but he added that such products will come during the next year or two.

"Using the public Internet lines will reduce costs significantly," he said. "We're talking about huge savings, as companies no longer need to maintain private lines." ▶

SAN Takes Flight

Here's how EchoStar's new SAN will work:

■ The SAN, using open Fibre Channel protocols, grabs information as it is entered into the company's systems and creates a mirror of the data.

■ The SAN then converts the information to an IP packet and sends it via the Internet to a remote location.

■ The remote location then stores the data, which can be used for either disaster recovery or data mining.

Airline-Backed Hotwire Opens Ticketing Web Site

BY MICHAEL MEEHAN

A new online discount-ticketing venture opened its Web site for business last week, giving struggling Priceline.com Inc. a direct competitor with financial backing from six of the largest U.S. airlines.

Hotwire, which is funded by United Air Lines Inc., American Airlines Inc., Continental Airlines Inc., Northwest Airlines Inc., US Airways Group Inc. and America West Airlines Inc., plans to auction off vacant airline seats to last-minute and price-fixated travelers. Norwalk, Conn.-based Priceline was the first entrant in that market, but it has been beset by a variety of problems in the past two months.

Another Blow

For example, Priceline was ousted from the Wallingford, Conn.-based Better Business Bureau of Connecticut for failing to respond to customer complaints. The company also warned that its airline ticket sales fell short of expectations in the third quarter, and the affiliate that handled Priceline's name-your-price service for gasoline and groceries said it plans to go out of business by year's end.

Another blow was dealt last week, when Atlanta-based Delta Air Lines Inc. — one of Priceline's earliest investors — announced plans to sell off its remaining · holdings in the company. Delta officials declined to comment on the reasons for the move.

But Henry Harteveldt, an analyst at Forrester Research Inc. in Cambridge, Mass., said he thinks the sell-off is a prelude to Delta taking an equity position in San Francisco-based Hotwire.

"Delta's not going to give United and American any kind of competitive advantage," Harteveldt said. "Priceline was an interesting experiment for [Delta], but the airlines are clearly getting behind Hotwire." ▶

IBM to Add Latent Storage Capacity

IBM announced last week that it will offer latent storage capacity in its Shark enterprise storage servers, Magstar tape libraries and virtual tape servers to meet the demands of rapidly growing Internet businesses.

With Shark servers, users will be able to access up to 980GB of additional storage within seconds should their demands require it, without the need to pay for the capacity until it goes into use. Tape volume cache capacity will offer up to 432GB of additional latent storage space.

IBM said it views this as a cost-containment method for businesses that may be unable to afford major storage purchases or reliably predict future capacity needs.

Ivar Chhina, president and chief operating officer of San Jose-based medical record retrieval company ChartOne Inc., plans on tapping the additional capacity as part of a storage outsourcing deal with IBM. "For us, it's a tremen-dous solution," he said. "It's not up-front capital. It's variable-cost capital. As I get money from my customers, I can pay for storage."

ChartOne plans to create digital images of hospital records that can then be stored and accessed by medical professionals via thin clients. "It's just a huge data need, and we'll need something that can scale quickly," Chhina said.

William Hurley, an analyst at The Yankee Group in Boston, called on-demand storage "a growing concern across the business spectrum."

Steve Duplessie, a senior analyst at Enterprise Storage Group in Milford, Mass., said on-demand capacity is becoming a standard in the storage world and that Hewlett-Packard Co. made a similar move last year. "You used to be able to wait 60 days for your stuff to arrive and then plug in and play with it," he said. "Now you can't wait 60 minutes."

– Michael Meehan

XML Gains Momentum in Financial Services Industry

Standards continue to proliferate

BY MARIA TROMBLY

Yet another XML-based standard has been added to the library of protocols being developed for financial services. Research Information Exchange Markup Language (RIXML) promises to make it easier for investors to share data about companies. A draft of the specification is expected within the next four months.

RIXML is backed by a number of industry powerhouses, meaning it will be an open standard rather than one that draws upon a particular vendor's technology. RIXML's supporters include Goldman, Sachs & Co., J.P. Morgan & Co., Merrill Lynch & Co., Morgan Stanley Dean Witter & Co. and PaineWebber Inc.

"We would expect people to be doing pilots in the first half of next year," said RIXML steering committee co-chairman Joseph Sommer, who is also director of U.S. electronic trading and connectivity services at Jersey City, N.J.-based DLJdirect Inc. A comment period will follow the draft release.

Sharing Research

RIXML would allow companies to share data by ensuring that their research reports all use the same electronic format so they can be easily published on the Web, on wireless devices or in paper formats.

RIXML is the latest of a large number of XML-based standards that promises to revolutionize the way Wall Street firms and investors make trades and exchange information.

Stamford, Conn.-based Gartner Group Inc. has estimated that some 350 XML standards are currently being developed, many of them in the area of financial services. The standards cover everything from corporate reports and press releases to internal accounting data.

On the brokerage side, standards fall into two categories, said Dushyant Shahrawat, an analyst at Needham, Mass.-based TowerGroup.

On the Sidelines

RIXML is a research-oriented standard. Other standards, such as Financial Information Exchange Markup Language, deal with processing trades.

"The majority of the industry is still on the sidelines and hasn't adopted these standards," Shahrawat said. "However, the 30% using them are driving 70% to 80% of the business. These companies comprise a large part of the overall market."

RIXML steering committee members said they don't think other upcoming information technology initiatives, such as the switch to next-day processing of trades (T+I) from the current third-day standard and the decimalization of stock prices, will hinder RIXML implementation.

"From T. Rowe Price's perspective, we're already in pretty good shape as far as T+I is concerned," said David Seibert, co-chairman of the RIXML steering committee and vice president for investment systems at T. Rowe Price Associates Inc. in Baltimore. "We're 90% towards T+1 today, so we don't see that as a factor in our critical path."

In addition, RIXML, although firmly vendor-independent, will include vendors at later stages of the process. Rival standard Investment Research Markup Language, on the other hand, was developed primarily by Multex.com Inc. in New York. Because RIXML will be open, Wall Street firms will be able to outsource the conversion.

"Not every firm will be faced with the issue of building it internally," said Steve Chandler, director of research at American Century Investment Services Inc. in Kansas City, Mo. ▶

Financial XML

XML standards under review in the financial services industry include the following:

FpML
Financial Products Markup Language
- For trading over-the-counter stocks
- Backed by J.P. Morgan and PricewaterhouseCoopers

FinXML
Financial XML
- For bonds, swaps, foreign exchange, market data, payments and settlements
- Managed by an independent consortium called

FinXML but still mainly controlled by Integral Development Corp.; backed by Integral, Chase Manhattan Corp. and Sun Microsystems

XBRL
Extensible Business Reporting Language
- For financial reports and data
- Supported by the American Institute of Certified Public Accountants and 30 other organizations

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W3C Readies Long-Awaited XML Schema Spec

BY CAROL SLIWA

Companies interested in using XML-based documents such as purchase orders or invoices for their business-to-business transactions got some long-awaited news last week.

The XML Schema specification that will help define the structure, content and semantics of those business documents is nearing the home stretch after almost two years in development. The World Wide Web Consortium last week announced that XML Schema has reached "candidate recommendation" status, meaning the Web community can implement and provide feedback on the specification.

"Databases, [enterprise resource planning] and [electronic data interchange] systems all know the difference between a date and a string of text, but before today, there was no standard way to teach your XML systems the difference. Now there is," said Dave Hollander, chief technology officer at Palo Alto, Calif.-based Contivo Inc. and co-chairman of the XML Schema working group.

Seeking Feedback

Michael Sperberg McQueen, also co-chairman of the working group, said feedback will be accepted at least through Dec. 15 at *www-xml-schema-comments@w3.org*. He said he doesn't expect XML Schema to be finalized until February, at the earliest.

In the absence of an XML Schema standard, various vendors and vertical industry groups have devised their own Document Type Definitions (DTD) to suit their needs for exchanging business data.

"DTDs are getting more entrenched since [XML] Schema is late," according to David Smith, an analyst at Stamford, Conn.-based Gartner Group Inc. "The later it is, the longer it's going to take to displace what people are currently using."

In other XML news last week, a group of technology industry vendors announced plans to define an XML-based standard that will help companies coordinate and process multiparty transactions. Bowstreet Inc., Hewlett-Packard Co., IBM, Oracle Corp. and Sun Microsystems Inc. said they will work together on the Transaction Authority Markup Language.

James Tauber, director of XML at Portsmouth, N.H.-based Bowstreet, said the group expects to turn over an initial specification to a standards body in January. ▶

HP to Buy Way Into XML Club

XML server key to Bluestone deal

BY JAIKUMAR VIJAYAN

HEWLETT-PACKARD Co.'s planned acquisition of Bluestone Software Inc. adds a crucial new capability to HP's portfolio of software for e-commerce applications, analysts said.

Philadelphia-based Bluestone will become a wholly owned subsidiary of HP under the stock-for-stock deal announced by HP last week.

Under the agreement, Bluestone shareholders will receive .24 shares of HP common stock for each share of Bluestone common stock. Based on HP's closing price in the middle of last week, the deal is worth almost $432 million.

Bluestone makes XML-based server software for directing and processing requests between Web-based clients and back-end database servers. The capability is considered one of the central components for building large e-commerce applications.

Many vendors — including IBM, with its WebSphere application server, and Sun Microsystems Inc., with its iPlanet suite — offer similar technologies.

Gaining Access

HP's purchase of Bluestone gives it access to one of the leading product lines in the XML server space, said Warren Wilson, an analyst at Summit Strategies Inc. in Boston.

"Bluestone has invested a lot of time and energy over the last couple of years to bring a strong XML-based platform," Wilson said.

"HP is getting one of the best XML and Java-based application servers that's available," said Josh Walker, an analyst at Forrester Research Inc. in Cambridge, Mass. "It's going to allow HP to get into the game with established winners such as IBM and Sun." ▶

NEWS

New Zealand Rolls Out VoIP Phone System

New Zealand's chief executive of the Ministry of Social Policy, Dame Margaret Bazley, last week announced in Wellington that her government has replaced legacy PBX systems with a converged data and voice over IP (VoIP) network. Combining phone and data systems lowers phone costs and creates a network that's easier to administer, Bazley said. The system, which Bazley said carries 150,000 voice calls per day, serves three government agencies in New Zealand. It employs VoIP telephones and network infrastructure equipment from San Jose-based Cisco Systems Inc.

BAZLEY: New Zealand's new VoIP system will lower phone costs

United Air Lines Forms E-Commerce Unit

Chicago-based United Air Lines Inc. last week announced the creation of an e-commerce subsidiary that will focus on the development of United's business on the Internet and on investing in businesses leveraging Web and wireless technologies. The company plans to invest more than $100 million during the next year in new partnerships and building United's online brand.

Short Takes

VERIZON WIRELESS INC. said it will create a Wireless Data and Internet Services division. . . . MICROSOFT CORP. subsidiary WEBTV NETWORKS INC. has reached a settlement with the U.S. FEDERAL TRADE COMMISSION over deceptive-advertising charges alleging the company made false claims about its WebTV system. . . . BARNES & NOBLE INC. and its e-commerce affiliate announced plans to more tightly integrate the company's brick-and-mortar retail stores with BARNESANDNOBLE.-COM INC.'s Web site through steps such as giving online shoppers the ability to return products to any of the stores.

Redskins Tackle Wireless Access

NFL team finds sponsor to build, host service at no charge to team or fans

BY LEE COPELAND

LATER TODAY, about 85,000 Washington Redskins fans will begin rolling into FedEx Field to see if the squad can better its 6-2 record in a game against the visiting Tennessee Titans.

And for the first time, football fans en route can address their biggest concerns — where to park and whether surefire Hall of Famer Darrell Green will play in the defensive backfield — via Web-enabled cell phones, pagers or personal digital assistants.

Last week, the Redskins jumped on the wireless bandwagon, launching a service called Mobile Flash that will offer traffic updates and team news alerts for free.

"This gives us a chance to connect with fans in a way that we are not ordinarily able to," said Jason Gould, director of Redskins.com. The Redskins brought Gould aboard at the start of training camp to use "technologically savvy mediums to keep in contact with fans," he said.

As part of that charge, the National Football League team also began piloting an e-mail alert program last month. So far, 16,000 fans have subscribed to receive daily e-mail alerts containing tidbits on trades, game statistics and player injuries, Gould said. A number of other sports teams, such as the San Diego Chargers, offer e-mail newsletters.

Still, the Redskins are the first NFL squad to tap into wireless data services, NFL officials said. The Redskins' communications staff can input messages of up to 80 alphanumeric characters that get transmitted instantly to fans who sign up for the free service at *www.redskins.com*.

Although the Redskins' wireless service is free, David

REDSKINS FANS can get updates on players like Darrell Green (pictured) via wireless devices

Chamberlain, an analyst at Probe Research Inc. in Cedar Knolls, N.J., said services such as Mobile Flash are courtesy tools for corporations to build relationships with customers. A number of airlines, for example, offer wireless access to gate changes and flight delays for their top frequent fliers.

Ztango Inc. built and hosts the Java-based application for free for the football franchise to showcase its services. But the wireless application services start-up in Herndon, Va., wouldn't disclose costs.

"With wireless, there is much more complexity than in the wired world," said Dennis Gaughan, an analyst at AMR Research Inc. in Boston. "When companies look to add wireless services, many times they are looking for a hosted infrastructure because it's a skill set that most organizations do not have yet."

According to an AMR study of 900 corporations, 30% are budgeted for some type of wireless data access project this year. By 2002, approximately 10% of those surveyed predicted that such projects will account for one of their top three spending items. ▶

Napster Helps Notes Creator Find Groove

Ozzie's peer-to-peer collaboration beta gets wide support

BY JENNIFER DiSABATINO

Quake and Napster have pointed the way to the future of business computing, according to Ray Ozzie, CEO of Groove Networks Inc.

These mainstays of the wired teen nation were the inspiration for the latest product from Ozzie, creator of the Notes messaging and collaboration software from Cambridge, Mass.-based Lotus Development Corp., now a unit of IBM.

Groove Networks in Beverly, Mass., last week released a public beta version of its software platform at a multimedia press conference in New York that included some heavy-hitting endorsements.

Groove software lets small groups of people collaborate and interact in real time by transmitting data directly from computer to computer, instead of passing it through a centralized server, according to Ozzie. The architecture, called peer-to-peer, is also the basis for the Napster software.

The peer-to-peer technology was broadly praised at last week's conference by several experts and developers in a videotaped presentation.

"The potential for peer-to-peer, it's really the potential of the Internet," said Esther Dyson, chairwoman of EDventure Holdings Inc. in New York. "It allows each person to be the center of their own world, rather than having the center defined by somebody else."

Microsoft Corp. Chairman Bill Gates and Intel Corp. Chairman Andrew

OZZIE WAS inspired watching Quake players share strategies online in real time

Grove also provided videotaped endorsements of Ozzie's vision.

"Over time, we believe that most everyone who uses a PC or a network appliance to communicate over the Net will have three primary tools: e-mail, a browser and Groove," Ozzie said.

Carving Out a Niche

Similar to Napster, which is software that can scan for and retrieve music files from any computer that's linked to the Web, the Groove platform and applications built on top of it keep the data on the client side. Computers are linked directly and don't go through a server to share information.

"I think that Groove has probably carved out a unique niche for

itself because of the protocol and the delta [sharing of information and applications in multiple windows over low-to-moderate bandwidth]," said Dana Gardner, a research director at Aberdeen Group Inc. in Boston.

Similar collaborative tools are available from companies like Communispace Corp. in Cambridge, Mass., but Communispace hosts communities on a server instead of having users work directly from computer to computer.

Ozzie said he began developing a peer-to-peer platform after watching his teen-age son play the game Quake over the Internet with friends. They communicated with instant messaging and shared team strategies directly from computer to computer as the game ran. It made him wonder why business groups couldn't do the same thing, he said.

The Groove software will allow users to communicate and share files in different windows within a Groove frame, so all users will see and hear the same things. ▶

How business becomes e-business.™

The great e-business shakeout is well under way. For those who didn't make it, our condolences. At least the end was quick.

For those who have made it, who broke the code and figured out how to build a truly viable e-business, our heartiest congratulations.

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change, as long as they stay within the overall dollar value of their contracts.

Sanjay Kumar, the company's president and CEO, said the scheme was developed after users "told us they need more flexibility in how they license software and a faster, simpler, more cost-effective way to do business with us."

It's also an attempt to give CA a more predictable revenue stream, Kumar added.

Kumar said that he and other executives at the Islandia, N.Y.-based software maker hope that the new licensing model "eliminates the back-end-loaded nature of our business, where most license agreements are concluded in the final days of a quarter."

Greater Flexibility Expected

The new pricing model should give mainframe users more flexibility to define the length and dollar value of their licensing contracts, according to analysts. And large users may be able to derive better discounts when they enter into long-term agreements with CA through the subscription-based approach, they added.

"It sounds like something the finance people would be interested in," said Ray LeFebvre, lead Oracle database administrator at The Stride Rite Corp. in Lexington, Mass. The company was recently burned when it decided to switch database tools three and a half years into a five-year license contract with a vendor that was acquired by CA last year, he said.

Subscription-based schemes will give users better control over the length of their contracts and allow user companies to "let out cash more slowly over the period of a contract," said LeFebvre.

But the scheme does nothing to address long-standing and far more crucial user demands for cheaper usage-based software pricing, said Carl Greiner, an analyst at Meta Group Inc. in Stamford, Conn.

"The bottom line is that this is something that's meant more for Wall Street than for users," Greiner said. "From a customer point of view, nothing really has changed."

That's because pricing will still be based on the overall capacity of a mainframe installation instead of actual usage, Greiner added. Discounts will also depend on the length of a contract and its dollar value — just as before, he said.

Users have long argued that the capacity pricing model unfairly penalizes them, especially when upgrading to new hardware.

"At first blush, it certainly sounds like this will be something that makes it simpler [for users to buy software from CA]," said Richard Ptak, an analyst at Hurwitz Group Inc. in Framingham, Mass. "But it doesn't look like it is going to do a lot for [users] who are much more usage-sensitive and want to be tied into a pay-for-play pricing model."

CA's move comes at a time when users are increasingly reluctant to get into the kind of long-term contracts that have characterized the mainframe market for years now, analysts said. Even CA last week acknowledged that the number of long-term contracts it signed in the last quarter had dropped off sharply — the company inked only four deals worth more than $20 million last quarter, compared with more than 20 agreements of that size in the same period a year ago. ▶

Data Maps

as income, charitable donations, vehicle ownership and magazine subscriptions to create profiles of individual voters. When plotted on a geographic information system, the data gives campaigns a powerful tool for politicking at the household level.

Compared with the days of wall maps and pushpins, "it's gotten a hell of a lot more sophisticated," said Wally Clinton, president of The Clinton Group Inc., a Washington-based political communications firm for Democrats.

The systems are still too expensive for small campaigns on shoestring budgets. But party organizations and federal campaigns see the databases as such a competitive advantage that they're reluctant to talk about their capabilities.

The initial GeoVoter system cost roughly $20,000, Howard said, plus thousands of dollars for data to pour into it.

"It was a large investment," he said. "But when I can tell you that this person, in this district, is a known contributor, likely to take a yard sign for a candidate, a member of a Christian organization, he signed a couple of initiatives, he has a hunting license and he owns a four-wheel drive [vehicle], I know what issues are likely to drive" that person to vote Republican.

The same data could be in database tables, but pegging it to a map helps candidates see pockets of support and undecided voters. Then they can identify the best locations for town meetings, volunteer deployments, personal visits, billboards and yard signs.

The vendors of political mapping systems are little-known outfits such as Map Applications Inc. in Norwich, Vt., which makes the GeoVoter software; Cartography Unlimited Inc. in Bluefield, Va.; and SpatiaLogic Mapping Inc. in Lafayette, Calif.

The campaigns fill those systems with layer upon layer of data, starting with basic

GEOVOTER software helps candidates visualize pockets of support from voters and contributors

state voter lists. Washington-based Aristotle International Inc. offers a CD-ROM database of 150 million registered voters in the U.S., which can be sorted by party, voting history, age, district or 25 other criteria. Then the campaigns add credit reports, polling results, fund-raising data, responses to phone calls, attendance at political events — even notes from conversations with voters about hot-button issues.

Some observers said there's a danger of a privacy backlash.

Yet the data is publicly available, and the profiles are the same as those used by the direct-marketing industry. "I'll leave [the privacy debate] to the intellectuals," Clinton said. "It's my job to win elections, and this [database technology] is an indispensible tool for winning elections." ▶

NAS Study

nation cited by immigration opponents.

The report did find that the supply of H-1B holders is large enough to prevent wages from rising as quickly as they otherwise might in a tight U.S. labor market. But it failed to find conclusive evidence of disparity between the wages of domestic IT workers and foreign workers.

"Employers who want to save money have more incentive to send work overseas," said Herb Lin, who directed the study. "They don't save much by bringing people here."

Craig Hopkins, a network engineer at Houston-based accounting firm Harper & Pearson Co., said he believes that companies are hiring H-1B holders rather than promoting employees from within or training older IT workers.

But Jake Karrfalt, CEO of software company Alternative System Concepts Inc. in Windham, N.H., pointed out that employers are required by the government to pay H-1B holders prevailing wages.

Mark Pomerantz, director of technical services at Alliance Technology Staffing Inc. in New Canaan, Conn., said H-1B visa holders who work as contractors — rather than full-time employees — depress consulting rates. He said he's seen contracting firms get around Immigration and Naturalization Service regulations by classifying workers in a lower job category.

Suresh Raman, an SAP consultant and a six-year H-1B holder, said, however, that the view that H-1B holders depress wages is a myth. Raman has seen his earnings rise steadily over the years, and he now earns $150,000 per year.

Raman's wages are commensurate with U.S. professionals in the same field, said Pomerantz, but he said he believes Raman is an exception.

Using data on company layoffs from the U.S. Bureau of Labor Statistics, the study also found that while older workers — 40 years or older — are more likely to lose their jobs than younger ones, they find new jobs almost as quickly as younger IT workers.

But Pomerantz said the data was skewed because the study looked at workers 40 and older, while discrimination is mostly against workers 50 and older.

"There are plenty of 50-year-olds who would love to get training" in newer technologies, such as Java, but employers won't make that investment, said Pomerantz. ▶

Positions of H-1B Visa Holders in the U.S.

FIELD	% IN FIELD	MEDIAN WAGE
Systems analysis and programming	53.3	$47,000
Electrical/electronic engineering	4.9	$54,000
Computer-related occupations, not elsewhere classified	3.4	$49,000

SOURCE: IMMIGRATION AND NATURALIZATION SERVICE, WASHINGTON

MORE THIS ISSUE
Older workers should fight age bias with skills training, says Frank Hayes. **Page 106**

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Web Site Offers Bounties For Patent Information

BountyQuest aims to help firms prove or discredit patent applications

BY TODD R. WEISS

A BOSTON-BASED start-up company has launched a Web site through which firms can offer cash bounties as a means of finding information that could help prove or discredit patent applications.

BountyQuest Corp. said its Web site is aimed at businesses trying to locate so-called prior art that can show whether a patent has already been issued for an invention or idea. The lure for people who may have that information: cash rewards that start at $10,000 and could be as much as $1 million, depending on the data's value.

The bounty would be paid by the companies that are seeking the prior-art information, said BountyQuest CEO Charles Cella. He added that BountyQuest would earn revenue by charging listing fees to the companies, which would be able to anonymously post their requests for information.

BountyQuest has two well-known financial backers: Jeff Bezos, the founder and CEO of Seattle-based online retailer Amazon.com Inc., and Tim O'Reilly, the founder of computer book publisher O'Reilly & Associates Inc. in Sebastopol, Calif. Ironically, Bezos and O'Reilly were publicly at odds earlier this year over a patent case that Amazon eventually won.

In that case, Amazon applied for and won a patent for providing customers with "one-click shopping" on its Web site. O'Reilly and others had argued that the online retailer didn't invent the process but was merely the first company to actually register such a patent.

And the dispute isn't dead, despite the status of Bezos and O'Reilly as joint investors in BountyQuest. O'Reilly has

TIM O'REILLY has joined forces with an unlikely ally at Amazon

posted one of the first bounties on the new Web site, promising $10,000 to anyone who provides information that can overturn Amazon's patent.

Cautious Outlook

Len Rubin, an intellectual-property attorney at Gordon & Glickson LLC in Chicago, called the new Web site "an interesting innovation" in the patent law field. Prior-art research is typically conducted by law firms or other hired guns, but Rubin said the research is often stymied because of the large amount of information that needs to be examined.

Chris Silva, an analyst at International Data Corp. in Framingham, Mass., said bounties of $10,000 and more could be "a small price to pay for a company to get this kind of work done, basically pro bono,

by whoever decides they want to take on the challenge."

But even O'Reilly remains cautious about BountyQuest's future. "The [business] model is unproven," he said. "Will it work? We're not sure."

BountyQuest joins a small group of Web sites targeting patent-related issues, said Derrick Dominique, an analyst at Hurwitz Group Inc. in Framingham. For example, PatentAuction.com in Hunt, Texas, offers online auctions of patents and copyrights, and Information Holdings Inc. in New York has developed an online patent exchange called Patex. ▶

Lexmark Restructures

BY LINDA ROSENCRANCE

Printer maker Lexmark International Inc. last week said it will cut 900 of 10,900 positions and relocate its laser printer manufacturing operations to Latin America and Asia.

Lexington, Ky.-based Lexmark said the restructuring is expected to save the company approximately $100 million by 2002 and enable it to stay competitive in the printer business.

Marco Boer, an analyst at IT Strategies Inc. in Hanover, Mass., said the job cuts make sense. "It's probably not too surprising, in light of the fact that they announced last quarter that they were under tremendous margin pressure, and over the last few years, they've been moving more of their ink-jet production out of the country," Boer said.

"Lexmark probably will try to expand into other areas of business beyond where they are now to get control of margin, but it's unfortunate they had to lay off people," he said.

The cost-cutting moves came the same week Lexmark released its third-quarter earnings. Its net income for the period ended Sept. 30 fell 14% to $66.1 million, or 50 cents per share, compared with net income of $76.5 million, or 56 cents per share, for the same period a year ago. Lexmark said its lower-than-expected earnings were the result of slow ink-jet cartridge sales and weak European currencies. ▶

AOL, Yahoo Roll Out Wireless IM Services

Analysts predict pricing battle

BY BOB BREWIN

Mobile instant messaging advanced significantly earlier this month as America Online Inc. put its AOL Instant Messenger (AIM) on the nationwide Sprint Corp. network and Yahoo Inc. and Motient Corp. announced the launch of a wireless service that will provide messaging, e-mail and other applications to users of pagers made by Waterloo, Ontario-based Research In Motion Ltd. (RIM) starting next month.

Half of Sprint's 8 million customers have Internet-ready phones capable of using the AIM service, and all phones currently sold by Sprint have instant messaging capability, according to a spokesman for the company.

AOL has a strong commitment to wireless, says Dennis Patrick, president of AOL Wireless. Patrick, speaking at

the Cellular Telecommunications Industry Association's Wireless Information Technology 2000 conference in Santa Clara, Calif., earlier this month, said AIM services should be "even more useful in an 'anywhere' environment" than in corporate offices.

While Dulles, Va.-based AOL has already made its AIM

Instant Messaging Hits Wireless

■ Yahoo and Motient will start consumer service next month.
....
■ AOL and Cingular Wireless announced service last February; a pre-Christmas launch is expected.
....
■ Both ventures will launch on pagers from Research In Motion (RIM).
....
■ Yahoo/Motient hardware will be priced at $335. AOL may subsidize hardware costs so pagers will be priced at $99 to $149.
....
■ The user base is forecast to be in the millions, with RIM manufacturing capacity put at 5 million units per year.

service available over the Sprint network, it has yet to roll out a similar service announced in February for RIM pager users on the network of BellSouth Wireless Data LP (now part of Cingular Wireless in Atlanta). AOL failed to return calls seeking comment on when the launch will occur.

Rob Sanderson, an analyst at San Francisco-based Banc of America Securities LLC, said all the deal-making could result in a battle between AOL and Santa Clara, Calif.-based Yahoo for wireless users.

AOL hasn't announce pricing for its service with BellSouth, but Sanderson said AOL is expected to "subsidize" purchases of the RIM pagers to lure users to its service instead of the Yahoo/Motient offering.

The Yahoo/Motient service will cost $335 for a RIM 850 pager and $34.95 per month for unlimited messaging capabilities, said Dan Croft, a senior vice president at Reston, Va.-based Motient. The agreement with Yahoo is the "first big re-

tail deal" for Motient, Croft said, adding that the company's integrated terrestrial and satellite network has the capacity to serve "millions of users."

Until now, Motient has served vertical corporate markets and has run a variety of business-to-business and enterprise communications services for mobile and Internet users over its network. For example, Motient has an agreement to provide wireless data services to 47,000 delivery personnel at Atlanta-based United Parcel Service of America Inc.

Theoretically, those drivers could use the new wireless instant-messaging service. But Walter Purnell, Motient's president and CEO, said he doubts they'll use it, because UPS carefully choreographs every move its drivers make on the job.

Croft said the Yahoo/Motient service will provide "instant synchronization" between buddy lists of wired and wireless instant messaging users to make it easier to maintain one master contact list. Users with Yahoo e-mail addresses won't have to change them to use the wireless service, he added. ▶

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Earnings-Strapped Lucent Fires CEO

Analysts say move was overdue; former chairman, Schacht, takes over temporarily

BY JAMES COPE

FOLLOWING last week's move by the board of directors of Lucent Technologies Inc. to dismiss Richard McGinn as chairman and CEO, it was difficult to find anyone who voiced surprise about the development.

Former Lucent Chairman Henry Schacht will take the helm until the company finds a new leader. Schacht was most recently chairman of Avaya Inc. in Basking Ridge, N.J., the enterprise networking equipment division of Lucent that was spun off as a separate company on Oct. 2.

In view of Lucent's poor earnings performance, "most people were expecting [McGinn] to go," said Sandy Riach, director of standards and technology at U.K.-based Hilton Group PLC, a user of Lucent and Avaya equipment.

"There was little question that a shake-up at Lucent was in the works and that someone needed to be held accountable for the company's state of affairs," said David Willis, an analyst at Meta Group Inc. in Stamford, Conn.

Lucent needs a CEO who can make difficult decisions, such as getting rid of unprofitable units and positioning the firm to compete in the optical-networking business before it's too late, Willis added.

Change Overdue

Jim Slaby, an analyst at Cambridge, Mass.-based Giga Information Group Inc., said a management change was overdue at Lucent and that McGinn "was standing closest to the window." The Murray Hill, N.J.-based firm's poor financial performance this year and a resulting drop in the value of its stock are "unconscionable," said Slaby.

"Lucent has always believed [it] invented fire," he added. "That attitude, along with a be-lief on the part of executives that rivals such as Nortel Networks Corp. in Brampton, Ontario, and Cisco Systems Inc. in San Jose weren't capable of surpassing Lucent in the networking business, played a role in bringing the company to its current state, Slaby said.

Larry Hettick, an analyst at Tulsa, Okla.-based consultancy TeleChoice Inc., said McGinn had lost credibility both in forecasting earnings and in making the kinds of changes that Lucent needs to make to stay competitive.

Lucent needs to find a CEO who can establish a long-term strategic direction for the company and then make sure that sticks, according to David Toung, a financial analyst at Argus Research Corp. in New York. Currently, Lucent's business outlook "changes every quarter," said Toung.

Riach said Lucent was too slow to deliver optical-network products, and that tardiness may have adversely affected Lucent's business. He added that the company's Avaya spin-off seemed to be bringing technologies to market faster than Lucent did on its own.

Lucent said earnings from continuing operations during its fiscal 2000 fourth quarter ended Sept. 30 were $600 million, down from $768 million in the same period last year.

The company said it expects to break even this quarter, with revenue from continuing operations forecast to decline approximately 7% from last year. ▶

SCHACHT will be Lucent's CEO on an interim basis

Silicon Graphics: Parts Shortage Cut Into Revenue

Results will improve as supply problems ease, company says

BY TODD R. WEISS

The industrywide shortage of a ceramic material used to insulate embedded circuits in high-end computers is being cited as a prime cause of the disappointing financial results posted by Silicon Graphics Inc. in its first quarter of fiscal 2001.

Mountain View, Calif.-based SGI warned early this month that its first-quarter loss would be larger than expected and said it was implementing a series of restructuring moves, including the implementation of a new enterprise resource planning (ERP) system. SGI declined to name the ERP supplier, citing ongoing contract negotiations

Last week, the company said its operating loss during the quarter ended Sept. 30 totaled $93.6 million — a figure that was reduced to a net deficit of $49 million due partly to a $38.8 million gain from the sale of some investments.

SGI's first-quarter revenue was $426.3 million. That was down 17% from $514 million in the same period last year, when the company had a net loss of $225 million. SGI noted that the year-earlier figures don't include the results from two divisions that have since been sold off.

Bob Bishop, SGI's chairman and CEO, said in a statement that the high-end graphics computer vendor was hurt by a lack of needed components during the first quarter. The company's order backlog as of Sept. 30 was $367 million, up $69 million from the end of the previous quarter and about $120 million higher than SGI's targeted backlog level.

In shortest supply is a ceramic packaging material used to insulate application-specific integrated circuits (ASIC), according to a company spokeswoman. The material is used in high-end computers to protect against high temperatures produced by ASICs when a system is operating.

The supplier — which SGI declined to identify — is building new production facilities and will ramp up production to meet demand, but it will be midyear before there are substantial improvements in production, according to the company spokeswoman.
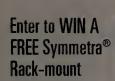
"While there is no short-term resolution to this industrywide component shortage, we are making every effort to lessen its impact on our business," Bishop said.

An Unlucky Victim

Jay Stevens, an analyst at New York-based Buckingham Research Group Inc., confirmed that materials shortages are "a general problem in the industry" at present and that SGI is just one of the unlucky victims.

"I'm confident with what they've said about the component shortages," Stevens said. "Everybody has talked about it." SGI's financial numbers are otherwise "tracking very much in line with their revised expectations," he added.

In a report issued last week following SGI's earnings announcement, John Jones Jr., an analyst at New York-based Salomon Smith Barney Holdings Inc., noted that the continuing materials shortages imply risk for the company's financial projections. ▶

JUST THE FACTS

In the Red

SGI's earnings report for its fiscal 2001 first quarter ended Sept. 30 includes:

■ **Revenue:** $426.3 million, down 17% from $514 million a year ago

■ **Losses:** $93.6 million, reduced to $49 million due partly to a $38.8 million gain from asset sales

■ **Order backlog:** $367 million, up $69 million from the end of the previous quarter

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NEWS

More Dot-Coms Resort to Layoffs, Closure

BY LINDA ROSENCRANCE

The dot-com carnage continued apace last week, with online beauty retailer Eve.com Inc. announcing that it's shutting its virtual doors and two other e-commerce ventures saying they're resorting to layoffs to stem their losses.

Stamps.com Inc., an online postage-services company in Santa Monica, Calif., said 240 workers are being laid off in a move that slashes its workforce by 40%. The job cuts follow the resignations earlier this month of the company's chairman, president and chief financial officer.

Meanwhile, Drugstore.com Inc. in Bellevue, Wash., disclosed that it's laying off 10% of its approximately 600 employees. The online retailer reported a net loss of $33.3 million for the third quarter and warned that it expects a similar loss in the fourth quarter and a deficit of as much as $110 million for next year.

Lacking Profits

In its shutdown announcement, Eve.com said it was unable to achieve profitability selling cosmetics online in the face of stiff competition. The San Francisco-based company plans to immediately lay off most of its 164 employees, leaving just "a minimal staff of personnel" to wind down the operations.

Stamps.com has almost $300 million in cash reserves, according to a statement by Marvin Runyon, a former U.S. postmaster general who took over as acting chairman of the company after this month's management resignations. But, he said, the layoffs announced last week "will strengthen our ability to attain our profitability goals."

Kelly McGinnis, a spokeswoman for Drugstore.com, said the company's layoffs were necessary because of the more skeptical view that venture-capital investors are taking toward online retailers. "Given the dramatic change in the investment market, we needed to look at how to manage our cash burn, and we decided to make [the necessary] changes," she said.

According to a survey by InsightExpress LLC in Greenwich, Conn., recent problems at online pharmacies such as Drugstore.com may be more than just a case of dot-com stock devaluation. Shoppers are staying away from online drugstores in droves: 93% of the people who responded to the survey reported that they have never made a purchase from an Internet-based pharmacy, said InsightExpress.

But Matt Stamski, an analyst at Gomez Advisors Inc. in Lincoln, Mass., said the problems are being felt by online retailers in general. "The bloom is definitely off the e-tailers' rose," Stamski said. "Each and every e-tailer, especially pureplays, are being called to profitability by their backers and investors." ▶

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Companies Don't Learn From Previous IT Snafus

*Hazy goals, culture of hiding problems
lead to more multimillion-dollar disasters*

BY KIM S. NASH

COMPUTER projects have failed for as long as there have been computers. But now that most companies are only as stable as their bits and bytes, the consequences of information technology screwups aren't easily disguised — they show up in earnings reports.

When IT goes bad, high-growth rocket ships like Oxford Health Plans Inc. and Ben & Jerry's Homemade Inc. report their first-ever financial losses. Others crater and run for bankruptcy protection, as did drug distribution giant FoxMeyer Corp.

In a *Computerworld* study of multimillion-dollar IT disasters (see chart, next page), the following two not-so-surprising themes emerged:

■ User companies like FoxMeyer often file tough-to-win lawsuits against the vendors or consultants involved. Nonetheless, collectively, users rarely seem to learn much from the episodes or apply the lessons to future projects.

■ All of the botched projects in *Computerworld*'s Top 10 disasters list were big and richly complex; many were the toughest IT projects the users had ever tried. Five were hideously difficult enterprise resources planning (ERP) system implementations.

Root Causes Remain the Same

The root causes of IT failures haven't changed a bit over the years.

Miscommunication, hazy goals, "scope creep," inept leadership, pitiful project management — you've heard, if not heeded, it all before.

"We may be neck-deep in the New Economy and Internet time, but you still have the same factors and the same failings," said Bruce Webster, a director at Pricewaterhouse-

Coopers in Washington.

Webster recently studied 120 IT lawsuits filed since 1976, and he said he's convinced that most flops could be avoided if people simply knew the time-honored best practices of systems development.

"I don't know how many IT managers, team leaders, directors and CIOs have actually sat down and read *The Mythical Man-Month*, *The Psychology of Computer Programming* and *Death March*," he said, referring to three books that amount to the software development canon. "The causes of disasters are all well documented. They're fundamental."

Still, warning lights are easy to overlook when the whole room is spinning.

"There's a natural tendency to get overly committed to something, especially when there are no clear signals telling you you are off course," said Mark Keil, an associate

professor at Georgia State University in Atlanta.

The infamously buggy baggage-handling system at the Denver International Airport is one case that offered unambiguous proof of technology glitches: shredded luggage.

But tests of most questionable IT projects don't yield such graphic evidence.

In large systems integration or ERP deals, "there's no torn suitcase sitting at your feet to wake you up," said Keil, who has studied IT disasters for nine years. "So it's a lot easier to delude yourself into thinking things aren't that bad."

Project Euthanasia

Euthanasia for the project might be the best course, but people often have too much heart and money invested to end it.

One technique for preventing a disaster is to add some humility to the endeavor. Invite a third party to review your work — a reliable consultant, an academic or a buddy CIO.

An outsider can "walk into the project setting for 20 min-

> The people with that failure experience aren't always the people in authority.
>
> **KEVIN HICKEY,
> FORMER HEAD OF IT AT
> OXFORD HEALTH PLANS**

utes, talk to a few people and come to the conclusion that things have run amok. But people inside may not even be aware," Keil said.

Greyhound Lines Inc. in Dallas, for example, seemingly didn't know anything was wrong with its new reservations and logistics system — until it went live and 12% of its customers went away mad in one month.

Though specific individuals might learn from their own mistakes, those lessons aren't

transferred to any collective IT consciousness.

"The people with that [failure] experience aren't always the people in authority the next time that situation arises," observed Kevin Hickey, a former head of IT at Trumbull, Conn.-based Oxford Health Plans Inc. (see story, page 36). "The fact is, hubris will always be with us."

And then there's what Webster calls "the thermocline of truth." Swimmers know that lake water separates into warm and cold horizontal bands. The area between is a thermocline.

In IT groups, everyone below Webster's "thermocline of truth" knows the project is sinking, while everyone above it thinks things are fine. Senior executives can be oblivious. They aren't involved enough, they don't want to have to face a failure, or underlings are afraid to tell them, he explained.

"You can see that persist almost until the point where the project is supposed to be delivered," he said. "Then, suddenly, it's, 'What do you mean this will take another six months?'"

That was part of the sorry plight of Fort Worth, Texas-based AMR Corp.'s Confirm reservations system. Confirm managers are even said to have orchestrated a cover-up (see story below).

Overall, IT culture is such that problems, especially ex-

DISASTER PROFILE NO. 1

Travel System Is Confirm-ed Disaster

**AMR's Confirm reservation
system was a historic
$125 million flop**

On the heels of its hugely successful Sabre airline reservation system, Fort Worth, Texas-based AMR Corp., the parent company of American Airlines Inc., in the late 1980s formed a joint venture with Marriott International Inc., Hilton Hotels Corp. and Budget Rent A Car Corp. to build a similar system for the travel industry. But Confirm, as the project was called, wasn't to be. In fact, the effort is viewed as one of the worst IT failures ever for its mismanagement, questionable ethics and unworkable software.

AMR's information systems unit in Dallas was the lead developer on Confirm, which was originally due in June 1992 for no more than $55.7 million. Yet Confirm started to miss deadlines and cost esti-

mates several months after development began.

Specifications were unclear, unskilled programmers were assigned to the project and mainframe-based transaction-processing software couldn't be integrated with a related mainframe decision-support system. Moreover, one year into design and development, Confirm had already fallen one year behind schedule.

Bethesda, Md.-based Marriott and Lisle, Ill.-based Budget started asking questions in 1990 but were assured that Confirm would work and that programmers would make up time and meet the deadline.

In April 1992, just three months before it was slated to go live, Confirm failed tests at Los Angeles-based Hilton. AMR also told its partners in a letter that it needed another 15 to 18 months.

"The individuals whom we gave

responsibility for managing Confirm have proven to be inept [and] concealed a number of important technical and performance problems," the AMR letter said.

The legendary Max Hopper, who had been instrumental in Sabre's development, was vice chairman of AMR's IT unit at the time, though not directly involved in the daily work of Confirm. However, he acknowledged in a note to his employees that some Confirm managers "did not disclose the true status of the project in a timely manner. This has created more difficult problems – of both ethics and finance – than would have existed if those people had come forward with accurate information" [News, May 22, 1995]. After consuming almost four years and $125 million, Confirm was effectively dead.

HOPPER: Some Confirm managers "did not disclose the true status of the project in a timely manner"

In September 1992, AMR sued Budget, Hilton and Marriott; Marriott then sued AMR. The suits were settled out of court for undisclosed terms. Hopper recently declined to discuss Confirm, citing the secret settlements.

AMR was mainly to blame, but all sides acted unprofessionally, said Effy Oz, an associate professor of management and IT at Pennsylvania State University.

Executives at AMR "simply lied to their client-partners," said Oz, who has studied Confirm. "The partners were irresponsible in not asking more questions more often and in accepting at face value all that [AMR] told them."

Budget, Hilton and Marriott today use their own – separate – reservation systems. *- Kim S. Nash*

NEWSDISASTERS

pensive ones (which hold the most valuable lessons), are hidden. Programmers write around buggy code rather than tear it apart. Managers revise project specifications to reflect what they did instead of what they should have done. Senior IT leaders neglect to tell their bosses the bad news.

Most companies are too embarrassed to analyze their failures, said Effy Oz, an associate professor of management and IT at Pennsylvania State University in Great Valley.

"People will say, 'There's no time, and we're not paid to have these discussions,'" Oz said. "The CEO has to be a very confident person to say, 'These things happen. Let's learn from it.'"

The average loss in an abandoned project is $4.2 million, according to Oz. The blowups in *Computerworld*'s top 10 list cost much more than that. And, if history is any indication, they will happen again. ▶

MOREDISASTERS

Dishonorable Mentions

BY KIM S. NASH

Some information technology disasters of the past decade aren't included in the Top 10 chart (at right) because their financial costs weren't clear or weren't quite as high as those that made the list. Others were quasigovernmental. But they were significant bungles nonetheless. Here's a sampling:

■ High hopes for a high-tech airport in Denver were dashed in 1994 when a baggage-sorting system misplaced and damaged countless suitcases. The object-oriented system, which was built by BAE Automated Systems Inc. in Carrollton, Texas, ran on IBM's OS/2.

To fix it, primary sponsors Chicago-based United Air Lines Inc. and the city of Denver ended up paying at least $86 million more than the original $193 million price tag. The airport opened almost three years late.

■ **Ben & Jerry's Homemade Inc.**, a small Vermont ice cream maker that hit the big time in the early 1990s, took a $4.1 million write-off in 1995 when it canceled a project to build a fully automated packing plant. As a result, the company posted its first quarterly loss ever.

■ Early this year, **Thomas & Betts Corp.**, a $2.5 billion electrical parts maker in Memphis, blamed problems with a new Internet-based order-management system for a 50% drop in profits in the fourth quarter of last year.

The homegrown mainframe system also cost the company another $42 million in order and shipping disruptions. In the following quarter, the company spent $11 million on customer service, extra freight costs and other measures to make up for ongoing system crashes and backlogs.

In a lawsuit still pending, shareholders say Thomas & Betts misled them about the success of the new system.

■ Just in time for the Memorial Day holiday crush in 1998, **Avis Inc.**'s Wizcom reservation system crashed. The outage blocked the rental car company, as well as many travel agencies and hotels also linked to the system, from taking bookings for 30 hours.

■ In the summer of 1994, an error in a routine file update crashed the automated teller machine (ATM) system of **Chemical Banking Corp.** in New York. ATMs at Chemical, which was then one of the five largest banks in the U.S., were down for five hours.

■ In 1993, **Fidelity Brokerage Services Inc.** in Boston started a multimillion-dollar project to build a Windows-based trading application for customers with home PCs. "Jamaica" still wasn't ready by mid-1996, reportedly because of political clashes between quirky programmers and staid investment bankers.

The application wasn't a failure; it worked when it was finally rolled out. But the numerous development delays put Fidelity far behind rivals such as Charles Schwab & Co. in San Francisco. ▶

Top 10 Corporate Information Technology Failures

AMR Corp., Budget Rent A Car Corp., Hilton Hotels Corp., Marriott International Inc. PROJECT: **Confirm reservation system for hotel and system for hotel and rental car bookings**

WHAT HAPPENED? After four years and $125 million in development, the project crumbled in 1992 when it became clear that Confirm would miss its deadline by as much as two years. AMR sued its three partners for breach of contract, citing mismanagement and fickle goals. Marriott countersued, accusing AMR of botching the project and covering it up. Both suits were later settled for undisclosed terms. Confirm died, and AMR took a $109 million write-off.

FoxMeyer Corp. PROJECT: **SAP ERP system**

WHAT HAPPENED? A bungled enterprise resource planning (ERP) installation in 1996 helped drive FoxMeyer into bankruptcy, the drug distributor claims in lawsuits still pending against SAP AG, SAP America Inc. and Andersen Consulting. FoxMeyer seeks a combined $1 billion in damages, but defendants deny doing anything wrong. Trials are scheduled for next May.

W. W. Grainger Inc. PROJECT: **SAP ERP system**

WHAT HAPPENED? Grainger spent at least $9 million on SAP software and services in 1998 and last year, but the ERP system overcounted warehouse inventory and routinely crashed. During the worst six months, Grainger lost $19 million in sales and $23 million in profits. Grainger patiently worked with SAP on fixes.

Greyhound Lines Inc. PROJECT: **Trips reservation and bus-dispatch system**

WHAT HAPPENED? Greyhound spent at least $6 million in the early 1990s building Trips. But Trips failed miserably when installed in 1993, crashing when Greyhound offered sale prices on bus fares. To avoid using the system, agents wrote tickets by hand while customers waited in line and missed buses. Ridership plunged 12% in one month. Just weeks after launching Trips, Greyhound disabled it in some regions while trying to trace problems. The debacle spurred a $61.4 million loss for the first half of 1994. The CEO and chief financial officer resigned. Trips is in use today, but Greyhound never regained its status as a transportation powerhouse.

Hershey Foods Corp. PROJECT: **IBM-led installation and integration of SAP, Manugistics Group Inc. and Siebel Systems Inc. software**

WHAT HAPPENED? To meet last year's Halloween and Christmas candy rush, Hershey sped up the rollout of a $112 million ERP system by several months. But inaccurate inventory data and other problems caused shipment delays and incomplete orders. Hershey sales fell 12% in the quarter after the system went live – down $150.5 million compared with the year before. Software and business-process fixes stretched into early this year.

Norfolk Southern Corp. PROJECT: **Systems integration with merger target Consolidated Rail Corp.**

WHAT HAPPENED? Norfolk Southern lost more than $113 million in business during its 1998-99 railroad merger with Conrail. Custom logistics software wasn't tested properly, and a dispatcher mistakenly fed bogus test data into the system. Norfolk Southern suffered more than a year of train backups, untrackable freight and crew-scheduling mishaps. Norfolk Southern spent an extra $80 million on worker overtime and fix-up costs until the system was stabilized early this year.

Oxford Health Plans Inc. PROJECT: **New billing and claims-processing system based on Unix and Oracle software**

WHAT HAPPENED? A 1996 migration to a new set of applications for the health maintenance organization's operations resulted in hordes of doctors and patients angry about payment delays and errors. The system also underestimated medical costs and overestimated income. As a result, high-flying Oxford posted its first-ever quarterly loss in November 1997: $78 million. All told, Oxford overestimated revenue by $173.5 million in 1997 and $218.2 million in 1998. New York state fined the company $3 million for violating insurance laws. Oxford replaced large parts of the homegrown system with off-the-shelf modules.

Snap-On Inc. PROJECT: **Conversion to a new order entry system from The Baan Co.**

WHAT HAPPENED? Despite three years of design and implementation, an order entry system installed in December 1997 cost the tools company $50 million in lost sales for the first half of 1998. Orders were delayed, and inventory was miscounted. Snap-On's operating costs soared 40%, mainly to cover costs of extra freight and temporary workers. Franchisees, frustrated because they couldn't operate the new software, turned to Snap-On competitors. Company profits for the period sank 22% compared with 1997.

Tri Valley Growers PROJECT: **Oracle Corp. ERP and application integration**

WHAT HAPPENED? A giant agricultural co-operative, Tri Valley bought at least $6 million worth of ERP software and services from Oracle in 1996. None of the software worked as promised; some of it couldn't even be installed on Tri Valley's Digital Equipment Alpha hardware, the co-op claimed in a $20 million lawsuit filed in February. Tri Valley stopped using the Oracle software and ceased payments to the vendor. Oracle countersued for breach of contract. Tri Valley filed for bankruptcy protection in July. Oracle denies all claims.

Universal Oil Products LLC PROJECT: **Software for estimating project costs and figuring engineering specifications, to be built and installed by Andersen Consulting**

WHAT HAPPENED? After a 1991 deal with Andersen resulted in unusable systems for UOP, the industrial engineering firm cried "fraud, negligence and neglect" in a $100 million lawsuit in 1995. Andersen later sued UOP for libel, accusing it of leaking incriminating e-mail by its consultants in an "attempt to publicly harass and humiliate Andersen." UOP hired another consultancy to implement the system. All suits were settled confidentially in 1998.

Methodology: Projects are listed in alphabetical order by company name. Selection of the IT projects was based on the amount of financial losses or damages sought in lawsuits. Only IT projects developed during the 1990s at U.S. corporations are included. Government projects are excluded. Thanks to Mark Keil (Georgia State University), Peter Neumann (SRI International), Esther Roditti (*Computer Law & Tax Report*), Bruce Webster (PricewaterhouseCoopers) and the *Computerworld* editorial research team, led by Mari Keefe, for their assistance.

Windows 2000 ADVANTA

The Web Magazine for IT Leaders Implementing Windows 2000 and Windows NT with Compaq Services and Solutions

Online this week:

POINT OF VIEW

The TaskSmart N-Series: Compaq and Microsoft redefining enterprise storage

Based on Microsoft Windows 2000 the new TaskSmart N-Series Network Attached Storage (NAS) appliance from Compaq makes it easy to deploy and manage advanced file storage.
www.windows2000advantage.com/pov/09-29-00_tasksmart.asp/300

TECH EDGE

Windows 2000 tied closely to Microsoft's .NET Initiative

Microsoft Windows 2000 is the centerpiece of its .NET initiative, which includes Datacenter Server. Microsoft shows the applicability of .NET by unveiling Windows 2000 server products.
www.windows2000advantage.com/tech_edge/09-22-00_NET.asp/300

Q & A

Microsoft VP Jim Ewel portrays Windows 2000's role in the business Internet

Jim Ewel, vice president, Windows .NET server marketing, has played an important role in some of Microsoft's prominent products. He discusses initiatives, which revolve around Windows 2000 and .NET.
www.windows2000advantage.com/qa/10-06-00_role.asp/300

COLUMNS

You can't beat the invisible manageability of Windows 2000

After covering the Microsoft Windows 2000 user beat for several months, Elisabeth Putnam has developed informed opinions. In this column, she reviews the likes and dislikes of early Windows 2000 implementers.
www.windows2000advantage.com/columns/10-16-00_users.asp/300

CASE STUDIES

Windows 2000 fever can be Infectious. Just ask Datareturn.com

After testing Microsoft Windows 2000 Advanced Server as part of Microsoft's Joint Development Program, Datareturn.com lost no time migrating its own Web site and customers' shared Web servers.
www.windows2000advantage.com/case_studies/09-18-00_infectious.asp/300

MOMENTUM SERIES >

Compaq's FutureSourcing manages Windows 2000, heterogeneous network infrastructure operations

FutureSourcing is Compaq's collaborative approach to helping companies deliver business results by providing IT infrastructure management services. With FutureSourcing, Compaq minimizes the client company's risk of managing new technology by providing resources that leverage new technology, speed time to market and reduce constant retraining.

For the full story, visit: www.windows2000advantage.com/momentum/10-23-00_futuresourcing.asp/300

CASE STUDY >

QCSI combo of Datacenter Server, Compaq ProLiant servers, outperform competing systems

Faced with the need to support ever-increasing processing volumes once it adopted an ASP model, healthcare developer and ASP QCSI found the high-end solution it was looking for in the form of Microsoft Windows 2000 Datacenter Server and Compaq ProLiant servers.

For the full story, visit: www.windows2000advantage.com/case_studies/10-23-00_qcsi_combo.asp/300

COLUMN >

Implementing service levels key to .NET success

Microsoft recently unveiled its .NET platform in San Francisco. The .NET platform evolves the current DNA programming model into one that is more in tune with the World Wide Web. According to Microsoft, the .NET platform provides "an underlying technology fabric and development framework that is uniquely suited to building and integrating Web Services."

For the full story, visit: www.windows2000advantage.com/columns/10-23-00_service.asp/300

www.Windows2000Advantage.com/300

Oracle's Rotten Idea

Tri Valley Growers says software scheme cost it $22 million

Tri Valley Growers got caught in an Oracle Corp. software scheme that Oracle CEO Larry Ellison later admitted was a bad idea.

In November 1996, the $800 million agriculture cooperative in San Ramon, Calif., bought $6 million worth of services and software from Oracle. The core of the deal was Oracle CPG, ERP software for consumer packaged goods companies.

While the financial and manufacturing pieces of the CPG suite were from Oracle, order processing, production planning and other packages were from other vendors. Oracle consultants were hired to integrate it all.

The new software was expected to make Tri Valley more efficient, improve customer service and save it $5 million a year.

In a press release trumpeting the Tri Valley deal in 1998, for example, Oracle said Tri Valley customers would be able to file a single purchase order, no matter how the cooperative managed its many fruit product lines internally.

But the system never got that far. Oracle couldn't get most of its applications to work with the non-Oracle software.

Tri Valley claims to have spent more than $22 million before halting the project and turning to SAP AG software.

The Oracle software "never worked, has not and cannot be integrated and could not even be installed on Tri Valley's computers," according to a lawsuit the cooperative filed in February.

Last year, Ellison called the Oracle CPG bundle "a huge mistake" [News, April 21, 1999]. Oracle no longer sells it.

In July, Tri Valley filed for bankruptcy protection. So far, it hasn't blamed its poor financial shape on the failed Oracle project – but it might, and it might ask for more money, to boot, said Peter Sipkins, Tri Valley's lawyer, with Dorsey & Whitney LLP in Minneapolis.

Oracle has denied all allegations. Tri Valley IT officials didn't return calls seeking comment. But a former IT manager there called the situation "very tragic."

A trial is scheduled for next June. – *Kim S. Nash*

High-Flying HMO Modernizes, Crashes

Oxford's homegrown Pulse system led to red ink, unhappy customers

Oxford Health Plans Inc. was the Netscape of health maintenance organizations. It seemed to burst from nowhere, captivate customers and force competitors to change the way they operated.

Then Oxford decided to modernize its information technology.

It was 1995 and Oxford's old turnkey, Pick-based billing and membership tracking system would no longer do. A complete overhaul, using more modern Unix technology, is what the company wanted – and fast.

The project included many custom applications that ran with Oracle databases and other software. But key was a claims processing system, dubbed Pulse, that Oxford's internal IT people built with Oracle tools.

Trouble hit the Trumbull, Conn.-based HMO almost as soon as the rollout started in late 1996. Customers suddenly got claims laden with errors – when they got claims at all. The company paid bills it shouldn't have and denied claims it should have paid.

All the late and inaccurate paperwork caused New York state to fine Oxford $3 million for violating insurance laws.

Overall, the new software overestimated revenue by $392 million for 1997 and 1998 while also underestimating medical costs. That awful combination led to Oxford's $291 million loss in 1997.

Angry doctors and patients abandoned the HMO. Membership dropped 20% from 1997 to 1999, partly because of the systems problems and partly because Oxford withdrew from four of the seven states it did business in.

Ultimately, top executives left, and Oxford hired a new head of operations – Kevin Hickey, then an operations manager at Aetna Inc. – to help with an IT cleanup already under way.

Hickey immediately faced down the billing mess, which "wasn't just an inconvenience. This was a survival issue," he said in an interview.

First, he shelved Pulse and returned to the old Pick application.

TRACEY KROLL

KEVIN HICKEY: The billing mess at Oxford Health Plans "wasn't just an inconvenience. This was a survival issue"

Pulse was never fully integrated with the Oracle software, he said.

Cambridge Technology Partners Inc. and Diamond Technology Partners Inc. came in for quick-hit assignments to help fix claims processing.

Oxford also shut down its advanced technology unit. Studying artificial intelligence software for possible future systems was frivolous now that "emergency" IT problems threatened to incapacitate the HMO, Hickey explained.

Oxford hired Computer Sciences Corp. to create a plan for outsourcing its entire IT operation.

But in 1998, a new CEO swept in and swept away that idea, along with most remaining legacy executives. Hickey, too, was replaced after just a year at the company.

Today, Oxford is smaller and smarter. It wrote off $5 million for hardware and software in 1998. Late last year, system fixes even took precedence over customer acquisition, according to documents filed with the Securities and Exchange Commission (SEC).

Oxford has since completed major systems fixes and put in place new quality assurance and other testing programs. But SEC documents warn that unexpected sales calculations could still turn up.

– *Kim S. Nash*

A Really Bad Bet for Drug Distributor

Bungled SAP project may have helped bankrupt FoxMeyer

When it launched a $35 million enterprise resource planning (ERP) project way in 1993, FoxMeyer Corp. was a $5 billion drug distributor in Carrollton, Texas.

Now it's bankrupt.

It wasn't the fumbled IT project alone that destroyed FoxMeyer, but that was a critical contributor, according to lawsuits FoxMeyer filed against SAP AG, SAP America Inc. and Chicago-based Andersen Consulting in 1998.

SAP lied repeatedly about R/3's capabilities, and Andersen's inexperienced staff used FoxMeyer as a training camp, claims the drug company, which seeks damages of $500 million from SAP and $500 million from Andersen.

FoxMeyer was one of the first big users to take a chance on ERP, which was a hot new idea at the time. Perhaps the company should have been more cautious. Legal documents show that FoxMeyer knew that SAP's R/3 software hadn't yet been used at distribution companies – just at manufacturers.

Still, FoxMeyer was jazzed. Then-CIO Robert Brown told *Computerworld* in 1994, "We are betting our company on this."

Big problems started to emerge later that year. For example, the new R/3 software miscounted inventory, which in turn screwed up customer orders. Outright crashes were routine.

SAP declined to talk specifically about FoxMeyer. But an SAP spokesman said users who install R/3 are usually changing basic business processes at the same time, which "is typically where most of the pain and challenges of implementation come from."

FoxMeyer also charges that R/3 performed worse than the company's proprietary Unisys Corp. system. R/3 could process just 10,000 invoice lines per night, compared with 420,000 for the Unisys setup.

SAP misled FoxMeyer with faulty benchmarks, according to the suit. Other users have also questioned SAP's benchmarks [News, Sept. 4, 1995]. SAP doesn't misrepresent benchmarks, the company's spokesman said.

As for Andersen, its people

> ## We are betting our company on this.
>
> **ROBERT BROWN, FORMER CIO, FOXMEYER CORP., IN 1994**

"were neophytes," said Mark Ressler, a lawyer from New York firm Kasowitz, Benson, Torres & Friedman LLP who represents FoxMeyer.

According to FoxMeyer, many Andersen workers were recent college graduates, and others lacked R/3 experience. "There's no better way to overcome that than [by] experimenting on a live patient," Ressler said.

They bungled data conversions by using incorrect drug product codes, for example, and built faulty interfaces between the old and new systems, the lawsuit charges.

As a result, most R/3 modules were rolled out to just six of 23 warehouses by the time the company filed for bankruptcy protection in August 1996.

Andersen didn't respond to requests for comments. The suits are slated for trials next May.

Meanwhile, FoxMeyer itself is being sued by stockholders, in part for allegedly hiding timely information about the computer problems and their effects on business.

– *Kim S. Nash*

In case you've gotten it backwards, you're supposed to work

eight hours a day, and your network's supposed to work twenty-four.

Two things are obvious. Your company needs a more reliable data network. And you need some sleep. That's where we can help. At BellSouth, we've designed an integrated voice/data network that has an exceptional record of reliability. Incorporating an architecture of over 14,000 SONET rings, our self-healing network provides automatic restoration and rerouting capabilities to guard your company from debilitating disruptions. We've even built a number of secure, bunker-like equipment facilities to withstand winds of up to 150 mph so your network stays up and running in even the most horrific conditions. And of course, we deliver world-class support and customer care. Now go home, get some sleep, and visit our website in the morning.

>>>connect>>and create something

BELLSOUTH

MARK HALL

Political leanings

L IVING IN A politically charged state capital (Salem, Ore.) near the boiling point of our media-saturated quadrennial contest, I can't avoid looking at the world politically these days. I even got to thinking about the politics of IT. Not the office survival kind — the voting booth kind.
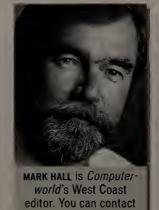
Never before have IT managers had to cope with so many issues involving government. Gone are the days when the only political hurdles you had to jump were in getting interdepartmental agreement on new application deployments.

Privacy, data access, security and other IT-specific issues now have the full attention of politicians everywhere. Journalists are only too willing to fan the flames with sensational stories about identity theft, credit-card rip-offs, privacy invasions and other digital sins left at the feet of IT. Legislators of all stripes are putting their names on bills that will affect your job and how you do it. The world, for good or ill, is awake and aware of the sheer pervasiveness of IT.

All this made me wonder whether the IT profession has a recognizable politics. Is IT a Democrat or Republican? Maybe a rabble-rousing Reform constituent? Possibly an environmentally minded Green Party member?

Individually, any of those may be true. And — thank goodness — few people base their votes solely on workplace issues. Just as I generalized that Wall Street power brokers are Republicans and reporters are Democrats, I pondered the

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politics of the data center.

My conclusion: IT is Libertarian.

For the record, I'm not a member of the Libertarian Party. I can't even name its presidential candidate. I suggest it only because I think it, as an organization, best reflects IT's political views.

IT folks know that technology is global and moves too fast to be controlled by provincial politicians who want to nail it down with the permanence of law. The less interference, though, the better for IT, making its politics Libertarian by nature. Of course, this is simplistic, but that doesn't make it less true.

Now, don't write to me proclaiming your devotion to a socialist state. Think instead about endless program modifications to satisfy legislative fiats. Suddenly, all those fringe free-market ideas will seem much more attractive.

In the meantime, you'd better get used to being at the center of the political storm. It's going to get worse. As companies increasingly use IT to serve more people and to extract direct or indirect financial value for those services, areas of public conflict will proliferate. Conflict, after all, is the handmaiden of politics.

Remember to vote next week. ▶

DAN GILLMOR

ICANN election carries hope of needed change

S OMETHING IMPORTANT is happening inside the most important Internet organization you've probably never heard of. A measure of reform may be in the wings at the Internet Corporation for Assigned Names and Numbers (ICANN).

Calling for reform of a 2-year-old organization may seem premature. But ICANN — whose international board of directors governs the domain-name system that lets computers find one another on the Net — has been a fairly high-handed outfit from the start. It has tended to represent powerful trademark holders and other corporate and governmental interests and has been directly unfriendly to critics and, by extension, to average Internet users who want a more open system.

Whispers of change came in recent voting for at-large board memberships, which ICANN didn't handle deftly. Prospective voters found it difficult to

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register. ICANN itself nominated many of the candidates. And non-ICANN candidates faced significant hurdles to nomination.

Despite all that, ICANN critics won in two of the world's five voting regions, North America and Europe, which are home to the majority — at least today — of Net users. Karl Auerbach, a researcher at Cisco Systems, and Germany's Andy Mueller-Maguhn, of the hacker-friendly Computer Chaos Club, had campaigned as severe reformers of a system they said they believe to be broken. They will hold only two of ICANN's 19 board seats. But the other board members should heed the message from the at-large voters in North America and Europe: It's time to open the system, and not just on the surface.

We'll know in coming months whether ICANN has any such intentions. The organization has been accepting applications for new top-level domains (TLD) to complement .com, .net, .org and the like. ICANN has indicated it intends to grant only a few new TLDs at most, an incremental policy that seems designed to favor those who have profited under the current system but that perpetuates its utterly unnecessary scarcity.

ICANN claims that it's limiting the number of new TLDs to ensure stability of the domain-name system. But technical experts point out that new country-level TLDs have been added regularly over the years with no apparent problems.

Unfortunately, ICANN's application process for new domain names is also flawed. The organization has demanded a nonrefundable fee of $50,000, a deterrent to noncorporate applicants. And some of the applicants are the usual suspects, including the monopolistic Network Solutions Inc. (NSI), that are seeking to reinforce their current choke hold by controlling new TLD registrations in ways that favor current domain-name holders. If ICANN lets NSI and its ilk run the new TLDs, little or nothing will change.

Will ICANN's new board members prod the organization toward more openness and the right kind of governance? All we can do is wait, watch and hope. ▶

TAD STEPHENS
Questions to ask before hiring a consultant

INCREASED COMPETITION, globalization, the development of Internet applications, rightsizing and a shift toward temporary project-oriented employment: These are just a handful of the reasons many IT managers will be hiring consultants like me.

Most consultants are hard-working and honest and have a genuine passion for what they're doing. But there are a few who conjure up an image of that dreaded trip to the dentist. Though their services may be necessary, your experience with them may be painful and expensive. After all, consultants want to make a nice living.

So what can you do to make this experience as painless and inexpensive as possible while getting the service you need?

David Copperfield says the difference between a magician and an illusionist is that the illusionist makes more money. Likewise, the difference between a consultant and a contractor may be that the consultant charges more. The difference may also be that the consultants possess the technical or business expertise to solve your business problems. Either way, be sure you have a plan for the job

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at hand before you talk to any consultant or consulting firm. The following three rules of thumb offer a good starting point:

1. What do you want the consultant to do? Before you talk to anyone, have a firm idea. If you don't, and your consultant is slightly on the self-serving side, he will decide what you want and how much it will cost. This can be expensive, may not solve your business problem and may limit your career mobility. Knowing what you need is the first step in avoiding scope creep, which some consultants call "business development."

A question to ask yourself at this point, if you haven't done so already, is, Am I looking to solve my business need and have someone to blame if things go badly? If this is your plan, make sure you're not unintentionally setting up your project to fail. If you and your management aren't behind the project from the start, don't do it. The best consultant in the world won't help.

2. What are you paying for? What does your consulting company provide you for the margin it's getting? Yes, you have every right to know what consultants are getting paid, no matter what the sales or business-development people say. Ask what solution the consultants are proposing. Are your employees saying the same thing? If they are, you don't need consultants. If your management wants solutions from consultants but your people have the answer, change their titles to "business-process consultants" and save the money.

3. What will you get, and can you re-create it? Maintenance is arguably the most expensive part of any business system's life cycle. Therefore, it's important to be able to efficiently maintain whatever system you get from your consultants. This can be accomplished partly in the form of documentation and should come with what you're paying for.

If you retain the rights to the system, know how it works. It's your software, so if you don't know how it works, your consultants will be back many times after you're gone. If your consultants aren't willing or able to do this, don't hire them. ▶

READERS' LETTERS

Driving to disaster

MANY government agencies are already scripting legislation because people can't talk on cell phones and drive at the same time. Now, Microsoft wants to add e-mail and databases to the distraction level ["Microsoft Launches Car .Net Dashboard Operating System," News, Oct. 23]. Built-in diagnostics and the ability to sync your Palm (presumably while safely parked) are one thing. The rest of this idea is a disaster (more likely, thousands of small disasters) waiting to happen.

When my car can drive itself, then it's time to add work activities to my commute. Till then, keep your hands on the wheel, your eyes on the road and your brain in gear.
Bryan Johnston
Houston

A site for sore eyes

I FIRST VISITED *Computerworld*'s Web site when I got my first PC with a modem in '95. Then, for some reason, I lost contact until today. I can't tell you how impressed I am with your site. The organization and navigation are excellent. But most important, in your news content and opinion columns, you're still not afraid to identify the emperors who are running around naked.

Keep up the good work. I'll be checking you out every morning from now on.
Eric S. Helland
Consultant
Milwaukee

Lost in translation

THE TRANSLATION of the Hebrew "Yetzer Ra" is "evil inclination" ["Meet the 'Hactivist,' " Business, Oct. 16]. If someone chooses a nom de guerre that reflects that concept, what are we to think of his intentions?
Michael S. Mantel
New York

FCC can blame itself

THE FCC is blaming broadcasters for its own short-sightedness ["TV 'Squatters' Jeopardize Time Line for Wireless," News, Oct. 16]. Let's look at the reasons the broadcasters are dragging their feet:
■ There is little HDTV programming available.
■ Cable systems aren't yet fully HDTV-compatible, but they provide the bulk of U.S. homes with broadcast signals. Digital cable services are twice as expensive as analog services.
■ The broadcasters' cost of conversion is high.

■ Much of America's viewing is reruns of '60s television and films made in the Academy aspect ratio of 5:4.
■ Few consumers can afford an $8,000 TV set. No HDTV recorders are even on the market.
■ Material on DVD is not HDTV-compatible.
■ Broadcasters are hamstrung by regulations that the cable channels are free to ignore.

If the FCC had not dragged its feet for a decade, HDTV would have been introduced into U.S. homes in the late 1980s, and the conversion would be complete today. Had the broadcasters not been given free frequencies and a deadline to convert, there would be no HDTV at all. The FCC should give the broadcasters the opportunity to meet the deadline the FCC set for them.
C. Marc Wagner
Student Technology Centers
Indiana University
Bloomington

Oracle's flawed prices

THE REASON I object to Oracle's UPU pricing structure is that the price is linearly proportional to the speed of the processor ["Oracle Goes on Pricing Defensive," Page One, Oct. 9]. As the processor speed doubles, the price doubles; however, performance does not necessarily double. If one deploys Oracle on a 400-MHz machine today and refreshes the hardware in 18 to 36 months, the slowest processor available may be, for example, 800 MHz. This requires the user to rebuy licenses (that is, to send in an amount equivalent to the original purchase) when the processor speed doubles. The process repeats every 18 to 36 months. This exposes users to uncontrollable cost increases.

Oracle is the only company in the industry that has introduced a pricing model that does not provide better performance at the same or lower cost over time. I am sure the price per UPU will drop over time, because Oracle will quickly become even less competitive, but this is not comprehended in the current price model.
Dennis B. Page
Detroit

COMPUTERWORLD welcomes comments from its readers. Letters will be edited for brevity and clarity. They should be addressed to Jamie Eckle, letters editor, Computerworld, PO Box 9171, 500 Old Connecticut Path, Framingham, Mass. 01701. Fax: (508) 879-4843. Internet: letters@computerworld.com. Include an address and phone number for immediate verification.

TECHNOLOGY BRIEF

▶ Alidian and Aevia are Working Together Maximizing Fiber Optics

Imagine doing your grocery shopping at dozens of different stores — picking up eggs at one supermarket, then dashing off to another to grab a gallon of milk. It would be a huge inconvenience, not to mention a total waste of your time.

Yet, IT managers often do the technological equivalent of that, enlisting one service provider to take care of their networking needs, another to handle storage and still others to get applications up and running. IT managers can spend months getting their entire infrastructure set. And, in the event of a problem, often times they need to call several providers to get it fixed.

One - Stop Shopping

Walnut Creek, Calif.-based Aevia Inc. saves IT managers precious time and money. As an application service provider and local exchange carrier, Aevia offers businesses one-stop shopping by virtually fulfilling an IT department's every need. Aevia provides voice and video services, storage area networking (SAN), unified messaging and a host of applications from third-party vendors, while offering high-speed broadband connections in terabit metropolitan-area transport networks.

"We offer a full range of services at very competitive prices," says Doug Picard, president and CEO, Aevia. Picard's goal is to offer 10 megabits to 1 gigabit of capacity and a spectrum of application functionality, including PeopleSoft, Oracle and Microsoft Office software.

Realizing the expense and not wanting to have to pass high costs onto its customers, Aevia decided to maximize the use of the fiber it would need. To help in that effort, it called in Alidian Networks in San Jose, Calif.

Alidian's Optical Service Network (OSN) family of products provides comprehensive service delivery, breadth and awareness within a single, highly scalable architecture for metropolitan-area network (MAN) environments. In short, Alidian technology takes the fiber that Aevia and other companies use and makes it more efficient.

The key is to maximize the amount of data placed on a single strand of fiber. Alidian's tools take customers' electrical inputs — for example, from Ethernet, LAN or storage-area network (SAN) traffic — and puts them on a single strand of fiber within a metropolitan area. Alidian has taken the best of existing technologies and coupled them with patented innovations to yield a hardware and software platform that customers such as Aevia find more cost-efficient than a synchronous optical network (SONET).

As a result, things like storage area network data, IT data, legacy ATM traffic and voice services can be transmitted on a single strand of fiber — quickly and cost-effectively.

"Our claim to fame is the true multi-service aspect of our equipment," says Bob Lefkowits, Alidian's vice president of marketing. "Once a carrier decides to lease that fiber, if they limit themselves to a single service, they're limiting their revenue. Alidian lets them offer a variety of services on that fiber." Just like telephone companies use shared lines for calls, Alidian enables multiple data streams to share fiber, with the equivalent of 16,000 phone calls worth of data on a single strand of fiber, according to Lefkowits.

"Our customers are buying the equipment that lights up the fiber, that takes the standard customer equipment that's there today — like phones, PCs, routers and hubs — and connects them outside of the building over fiber optics."

For Picard, two Alidian technologies were very appealing: WavePack, which allows multiple data types to be carried in native mode on a single wavelength and WaveSwitch, which permits adding and dropping individual services and application flows at multiple MAN nodes, eliminating the usual one-wavelength-per-drop-point requirement.

"Alidian made the only product that could carry the traffic natively, which fit into our technical plan," Picard says. "On top of that they use WaveSwitch technology. I can get more density out of the Alidian product; it's much more efficient, which lowers our overall network cost." In addition, all data is secure and Aevia's uptime is 99.999%.

Alidian's pricing, according to Picard, is competitive while exceeding in functionality. Using Alidian tools, Aevia runs an Ethernet network, allowing less experienced IT professionals to manage it, saving the company manpower. Factor in all the added efficiency, and Aevia is offering a three-megabit connection that will burst up to 10 megabits for $995 per month. Aevia has been busy testing its offerings. "It was very clean," says Picard. "The stuff worked from day one and it never stopped working. Right across the board it was a great test. We base-line tested one set of equipment at a time, starting with Alidian and layering in the rest of the technology ... through the whole test the Alidian stuff was flawless."

> "I can get more density out of the Alidian product; it's much more efficient, which lowers our overall network cost."
>
> —Doug Picard
> President and CEO
> Aevia

White
Paper

IN_fusion

Network Storage:
Delivering on the Promise

COMPUTERWORLD

CONTENTS

COMPUTERWORLD

Network Storage: Delivering on the Promise

By
Barb Goldworm,
EMA

As we round the corner of the last half of 2000, we are squarely in the midst of an information storage explosion. The cost of storage is continuing to drop dramatically — $.30 per megabyte now, estimated by some to drop to $.01 per megabyte by 2005 — making it practical to store larger and larger amounts of information at a reasonable cost. Data warehousing applications — now viewed as a competitive necessity — the overall effects of the Internet, e-business and the growth of imaging, video and music applications which involve large volumes of data are contributing significantly to the amount of information going online.
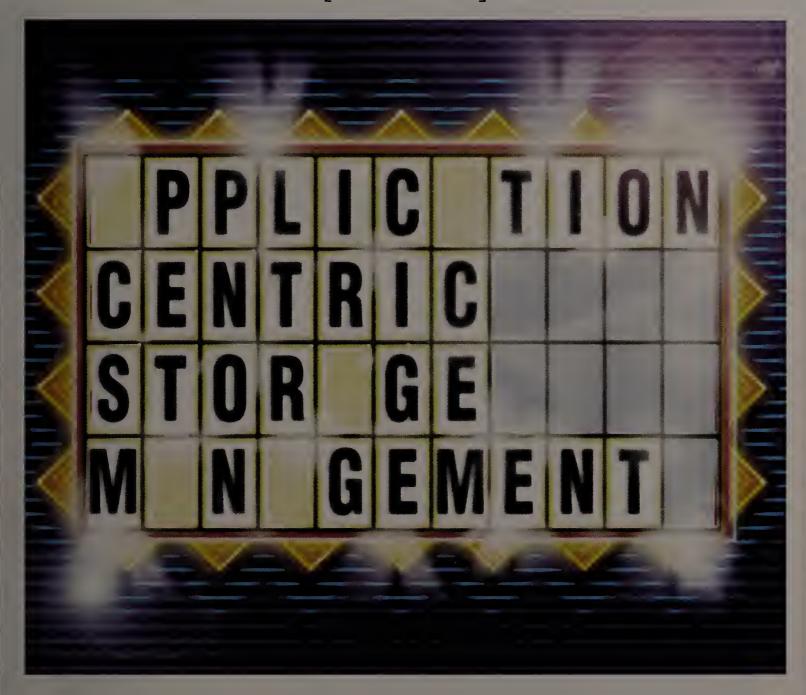
The Storage Explosion

This growth of information is significant in several ways. Storage requirements are estimated to be doubling on average every eight to twelve months. In addition, organizations must not only manage large volumes of data, but also handle extremely high growth rates of data, with often unplanned and unpredictable surges in the growth of that data. One commonly occurring example is a user e-mailing a 10MB graphics file to 100 users and using a gigabyte of storage. Lastly, as everyone goes online, the number of users accessing the information is increasing dramatically and their geographical distribution is worldwide.

Another significant change relates to availability. E-business, worldwide operations and even e-mail have forced IT into a 24/7/365 high-availability world. Information access is critical to application availability and has increased the importance of ensuring data availability. All of these factors have contributed to storage becoming a strategic issue for IT. In the past, the buying decisions on storage hardware were often completely tied to the servers, (i.e., buy a Sun server and buy Sun storage). Today storage is being evaluated on its own. With storage revenues today growing faster than server revenues, the amount of money spent on storage, along with its significance in terms of impact on availability, has put it into a new realm with extremely high expectations.

EFFECTIVE STORAGE MANAGEMENT *begins* WITH THE APPLICATION.

Storage is the foundation of information exchange – and every piece of stored data counts. In e-business, it's crucial to have immediate access to your critical data.

BMC Software's Application-Centric Storage Management™ solution manages your data in the context of its importance to your business. That means you get your most important data, when you need it, fast.

Visit www.bmc.com/storage/acsm to learn more about Application Centric Storage Management and register to win one of four MP3 players!

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The Realities of Network Storage Today

In the last several years, there has been a lot of debate over the realities of network storage and its ability to address these issues. There has been a great deal of skepticism over interoperability problems, cost versus benefits and manageability issues. The skepticism of many is juxtaposed with the marketing messages of network storage vendors with their product agendas.

This has made it extremely difficult for users to understand the reality of network storage today, where it can help and where the challenges still lie.

This article examines the current state of network

storage implementations — both successes and challenges — as experienced in the real world based on research conducted over the last 12 months by Enterprise Management Associates Inc. (EMA), a leading analyst and market research firm based in Boulder, Colo.

Network storage has seen dramatic changes in the last 12 months. Many of the early problems of Storage Area Networks (SANs) are beginning to be resolved, with users achieving extremely positive results in their implementations. Critics point to early SAN implementations as being pilots only, used in lab environments with limited data. According to EMA's most recent research, the size of SANs implemented exceeded 5 terabytes. One half of the respondents plan to have their SAN storage capacity equal to their total capacity, meaning all data will be stored on a SAN, within 24 months. As for the question of pilot versus production, 74% of those who had implemented SANs characterized their SAN-based applications today as business critical.

From an availability perspective, particularly for those business-critical applications, results have been excellent. According to EMA's research, while expectations were high, results have exceeded expectations across the board. 39% of the respondents had expec-

Common Network Storage Applications
Based on 41 respondents

Financial Applications — 44%
ERP Applications — 34%
Supply Chain Applications — 24%
E-Commerce Applications — 24%

Source: Enterprise Management Associates Inc.

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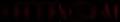
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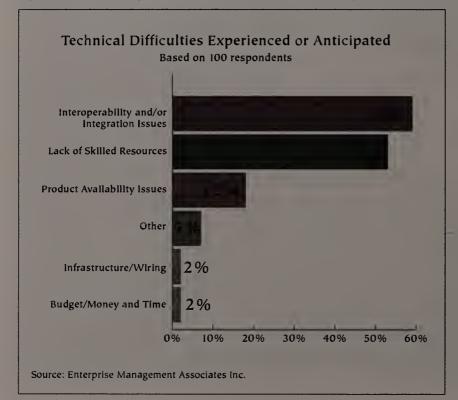
tations of no weekly downtime and an even larger 56% reported no downtime. 72% expected less than 30 minutes of downtime per week, or 99.7% availability, while 84% achieved it. In an industry where availability is key and hype is ever present, it's rare to see results exceeding expectations.

Fast access to data and manageability were listed by users as the top quantifiable benefits achieved by

Technical Difficulties Experienced or Anticipated
Based on 100 respondents

Interoperability and/or Integration Issues	
Lack of Skilled Resources	
Product Availability Issues	
Other	
Infrastructure/Wiring	2%
Budget/Money and Time	2%

0%   10%   20%   30%   40%   50%   60%

Source: Enterprise Management Associates Inc.

their SAN implementations, along with high availability and lower total cost of ownership (TCO) for storage. With good quantifiable benefits, 47% anticipated a Return on Investment (ROI) of less than 18 months. That number increases to 68% for an ROI of less than two years. While cost is still seen by many as a barrier to implementation, when viewed from a TCO and ROI

perspective, the results are good.

One issue that has plagued SANs from the beginning is interoperability. SANs include numerous components manufactured by numerous vendors. There were initially many problems with ensuring that components interoperate with one another. Interestingly, of those interviewed who were not implementing a SAN, less than 9% cited interoperability issues as the reason — most believed their storage needs were too small.
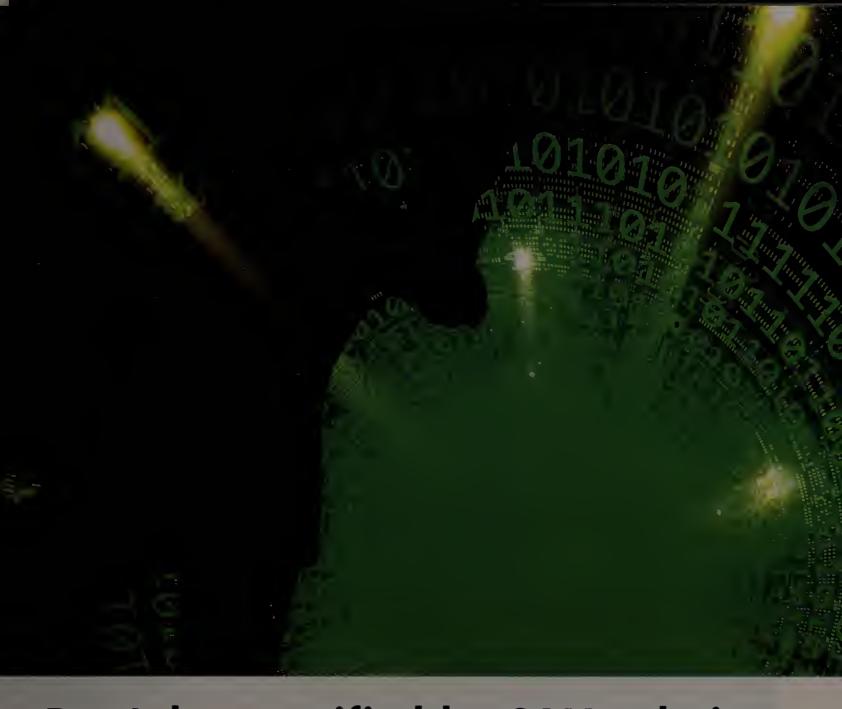
There is much work being done currently to improve interoperability issues, in terms of standards work and interoperability testing and certification. Groups such as the Fibre Channel Industry Association (FCIA) and the Storage Networking Industry Association (SNIA) are helping vendors to work together on interoperability and standards.

SANs and NAS
Another key area of change within network storage has to do with technology innovations. Initially network storage consisted of two main options, SANs and Network Attached Storage (NAS). SANs were based on Fibre Channel technology and NAS was based on the concept of a storage appliance, which included under-the-covers functionality of a file server along with a set of storage devices and could easily be added on to an Ethernet network. The file server was a stripped down version of a server optimized specifically for this purpose.

Network Appliance Inc. still leads the pack as the dominant player in the NAS space, which has grown

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and continues to grow substantially. There are now NAS options, which include much larger capacities, and with Gigabit Ethernet coming into play, NAS will support faster speeds in the range of SAN speeds. The file server functionality also provides certain benefits in terms of file sharing and file management.

SANs, on the other hand, are based on the concept of separating storage from its server. Instead of a server owning a storage device with a one-to-one ratio of server to storage, SANs replace the Small Computer System Interface (SCSI) connection from a server to its storage with a network connection. This allows every storage device to sit directly on the network and be accessible by many servers, introducing a many-to-

many network-type approach to storage. In addition, the storage network is a separate network from the LAN, thus separating the storage-specific traffic from the normal LAN traffic. The SAN storage can also then be managed as a pool, allowing virtual slices of the pooled disk to be given to individual servers. This eliminates the problem of one server having lots of unused storage while additional storage must be purchased for a different server.

Initially the SAN network connection was done using Fibre Channel, either switched fabric or a Fibre Channel Arbitrated Loop (FC-AL). Fibre Channel also adds the ability to physically separate the storage up to 10 kilometers away from the server. This allows servers

to remain distributed while storage devices can be centrally located and managed, providing advantages to physical tasks such as centralized tape backup.
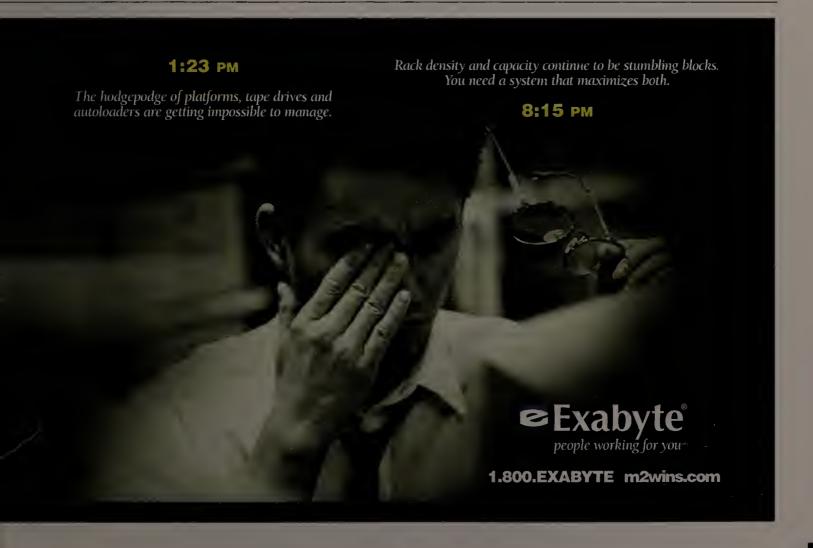
Early definitions of SANs included Fibre Channel as the required transport; however, the definition is clearly changing. Many additional technologies have been/are being introduced in this area, allowing changes ranging from SANs comprised of SCSI-based devices, to the use of Gigabit Ethernet, to SCSI over IP and Fibre Channel over IP. In a study completed in February where respondents were given a definition that included Fibre Channel, only 5% disagreed that Fibre Channel was a requirement for a SAN.

Other interesting combinations such as a NAS box, where the connection from the NAS server to its storage is based on a Fibre Channel SAN, bring together the benefits of the NAS server and the scalability of a SAN. As all these technologies continue to evolve, there will continue to be convergence of NAS and SANs in a variety of ways. All of these network storage technologies will ultimately provide alternatives for large enterprises and service providers, mid-size shops and small-to-medium businesses.

Challenges

Even with all the positive things happening with network storage, it is still not perfect. There is a tremendous lack of awareness and understanding both in the

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benefits of network storage options and in the technologies involved. Perhaps the fact that network storage requires skill and knowledge in both storage and networking adds to the difficulty in finding talent. In addition, the speed with which changes and new technologies are coming, along with the number of new companies and products emerging, make it difficult to keep up.

These issues are propelling many users towards the use of professional services and/or Storage Service Providers (SSPs). Users are looking to hardware/soft-

Results experienced, however, are making this less of an issue as TCO and ROI numbers from early users are helping to make strong business cases.

Evaluating Network Storage

With all that network storage has to offer, it is important to understand how to evaluate where and whether it fits into your business strategy. To do this, it is helpful to understand what has driven current users to adopt network storage. EMA's research consistently indicates that many of the benefits described by vendors are indeed the reasons that users give for why they are using network storage. The top reasons users have given for using network storage include making it easier to share and to manage storage resources and providing higher data availability. Faster data access, reliability and scalability were also high on the list. These factors all tie into several key areas, which should be part of any evaluation of where network storage fits into your organization.
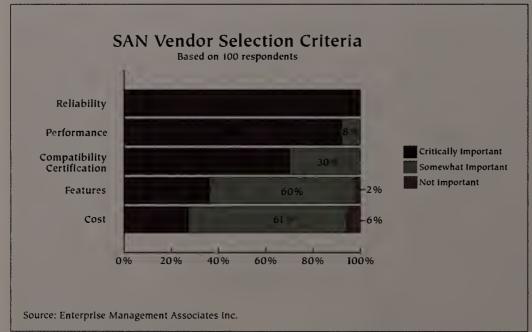
Allowing all storage to be pooled, allocated, managed and backed up by a central staff in a central loca-

SAN Vendor Selection Criteria
Based on 100 respondents

Reliability
Performance 8
Compatibility Certification 30
Features 60% 2%
Cost 61 6%

Legend:
- Critically Important
- Somewhat Important
- Not Important

0% 20% 40% 60% 80% 100%

Source: Enterprise Management Associates Inc.

ware vendors and independent consultancies to help with defining a strategy, designing their network storage architecture, selecting products, implementing solutions and providing ongoing management.

To a lesser extent than other barriers, high cost is still somewhat of an issue, with entry costs of Fibre Channel keeping some users in wait-and-see mode.

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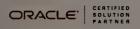
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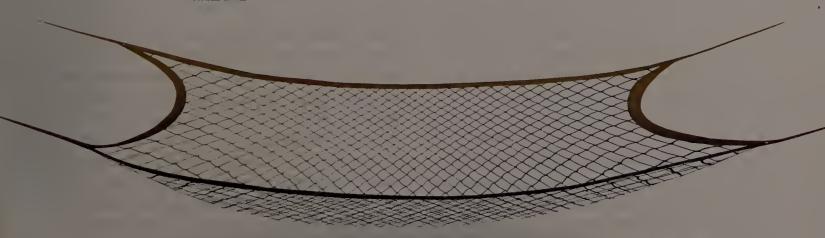
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tion will have financial, physical and organizational ramifications. Also, it is not only the amount of data storage required but also the growth rate and predictability of growth of the data that is important. It is important to evaluate the value of your data and understand the cost trade-offs of high availability and data protection.

Another factor in evaluating network storage is the application requirements within your organization. Once again, EMA's research consistently shows certain applications to be drivers of network storage. (See chart, page 6). Data warehousing continues to be the number one application driver. Given the volume of data involved and the criticality of that data, it is a logical choice for SANs. Messaging and non-revenue-generating Internet applications are also common applications running on SANs. Both involve potentially large amounts of data, with high and unpredictable growth and 24/7 availability requirements. Understanding where your organization's requirements are for these applications is another key factor to evaluating where network storage fits.

After reviewing the business reasons and the application needs, the next step is to assess the current environment and its shortcomings. Looking at such things as data availability, performance, the impact of backups and replication should be done from today's perspective as well as for future growth.

Lastly, once a general assessment has been done, it is important to consider several things in evaluating vendors. The first key decision is whether to use a single vendor or multiple vendors. In general, most current users preferred an integrated SAN solution from a single vendor. Storage and server hardware vendors with a combined offering top the list, with systems integra-

tors and SSPs following. Reasons for this preference include likelihood of success, shorter implementation time, one-stop shopping and compatibility/integration issues. In terms of vendor selection criteria, all current users rated reliability as critically important, with performance as a close second, followed by compatibility certification. (See chart, page 12).

Who's in Charge of Network Storage?

One of the challenges in network storage is that it represents a merger of networking and storage. Given that, who should be responsible for defining, implementing and managing this network storage strategy within an organization? EMA's research shows that over half of the users who have successfully implemented SANs had network administrators and/or engineers involved in the process. Just under half involved their systems administrators, while 12% involved storage administrators. In terms of ongoing management, just under half said their systems administrators were managing the SAN, with 35% indicating network administrators and 15% stating storage administrators.

Final Analysis

There is much to be said for today's delivery on the promise of network storage. While it consists of an emerging set of technologies with many changes and advances still in progress, there are products and services available today to reap many of the benefits to help deal with the storage explosion. Having a clear understanding of your needs and priorities, making careful assessment of today's solutions and keeping an eye towards staying open for the future, network storage can be a valuable part of your 24/7 e-business infrastructure.◗

Network Storage
The Challenge

By
Tom Burniece
&
Lisa Hart,
IN_fusion Corp.

We are in the early stages of a technology revolution centered around the Internet and dramatically changing the way we communicate, are entertained and conduct business. In this revolution there are challenges for high-end storage to overcome.

The Challenge for Storage

The future will see a highly effective, integrated network that will span the Internet, the enterprise and the home. This will deliver a wealth of rich-content information that can be accessed interactively and will result in an explosion in stored data. As a result, huge opportunities will open up for services and products that can automate the provisioning of this data and create a global storage "utility". (See chart, page 16).

This will open up new business-critical applications that will shift the economic model to one where information will become the most important capital asset for virtually every enterprise.

Improvements in network bandwidth, computing speeds and storage device capacity, performance and cost will continue to fuel improvements in hardware, but the key to success will be software and service.

Recent forecasts from Framingham, Mass.-based International Data Corp. are that corporate networks will store 57,000 petabytes of information by 2004 (one petabyte is equal to one million gigabytes). Storage device density is increasing between 60% and 100% every year and device pricing is falling 35% to 40% per year. The cost of managing these devices continues to increase, according to Santa Barbara, Calif.-based Strategic Research Corp.

The following is an example of the disruptive forces impacting network storage today:

- Server disaggregation
- Network bandwidth growth is exceeding Moore's Law
- Shifts in the access model for networks, including broadband and wireless
- Outsourced networks, storage and applications to service providers
- Globalization of business, including new business-to-business applications
- Convergence of entertainment and computing

The resulting impact on storage is:

- Network storage is becoming the dominant model
- LANs, SANs, MANs and WANs will converge
- Ethernet/IP will dominate as the way to connect network storage within five years
- InfiniBand will take over within five years as the data-center cluster interconnect
- Storage will be virtualized and outsourced
- Data will be highly distributed/replicated
- Data security will become critical

Server Disaggregation

The prevalent method of attaching storage in the past has been to dedicate it to a single server, which then served the data to attached clients. As the Internet has taken off, the client/server model has been changed to more of a peer-to-peer model with a need for shared access to distributed data. In effect, every computer can be a repository of information for any other, serving up music files, streaming media and even computing power. As a result, network storage is now the norm, with two models currently being deployed: Storage Area Network (SAN) and Network Attached Storage (NAS).

SAN and NAS

The purpose of a SAN is to provide a dedicated, high-performance network where servers can share stor-

age. The purpose of NAS is to provide highly optimized, integrated storage solutions that can be added directly to a LAN. As a result, SAN and NAS have evolved somewhat separately, but have common elements. A hybrid is likely to evolve, as we seek heterogeneous storage solutions that are more appliance-like in their function and ease of use (where NAS shines), and are also highly scalable in both performance and capacity, plus highly reliable (where SAN shines). Once this is achieved, we will have a true "storage utility" that delivers complete solutions across distributed and dynamic applications.

As a result, the fundamental difference between them today is SANs communicate at the data block level, while NAS communicates at the file level. The back-end for both NAS and SAN devices is typically a number of disks connected through a disk controller via either SCSI or Advanced Technology Attachment (ATA).

The storage industry is working on implementing IP protocol support on Fibre Channel so NAS devices can be attached as nodes in SANs.

Several emerging technologies are being developed at this time that will blur these differences and bring about the merger of SANs, NAS, LANs and even Wide Area Networks (WANs) into a single cohesive network architecture with a common set of management tools.

To Create a Global Storage Utility

The network and storage industries must collaborate to provide the following needs for IT professionals:

- ◆ Infinite scalability in capacity and performance
- ◆ 100% data availability, integrity and recovery
- ◆ Instant, ubiquitous global accessibility
- ◆ Complete heterogeneous interoperability
- ◆ Security at all levels
- ◆ Robust management

The latter is especially important, since managing separate network infrastructures is one of the daunting challenges currently facing IT professionals. The bottom line is that IT professionals want one network and one set of tools that will handle all networking technologies, including storage.

IP Storage

Since Ethernet is the most widely deployed and fastest growing network transport media standard, it enjoys an insurmountable installed base and cost advantage over Fibre Channel. Thus, it makes sense to eventually connect all storage, as well as the clients and servers, via Ethernet. Preferably, this will be over a very high-speed physical layer, such as 10-Gigabit Ethernet running on fiber. In addition, TCP is the dominant Internet transport protocol and IP is the dominant Internet routing protocol, so it also makes sense to run storage on TCP/IP, even though there are some performance issues to deal with in TCP. As a result, an emerging technology that is likely to gain acceptance in the next few years is IP-based storage, where the SAN is connected to servers via Ethernet rather than via Fibre Channel or SCSI. There are a number of approaches currently being proposed for IP Storage but they will eventually come down to:

1. SCSI layered on top of TCP/IP
2. FCP tunneling over TCP/IP

The likely winner is the first one (also called ISCSI), since it can be implemented end-to-end across standard Ethernet LANs, with no translation or bridges required. The second will likely play a key role in extending Fibre Channel across Metropolitan Area Networks (MANs) and WANs but this requires special hardware on both ends.

According to Strategic Research, IP Storage will penetrate new server shipments rapidly starting in 2003, whereas InfiniBand will have a slower adoption rate.
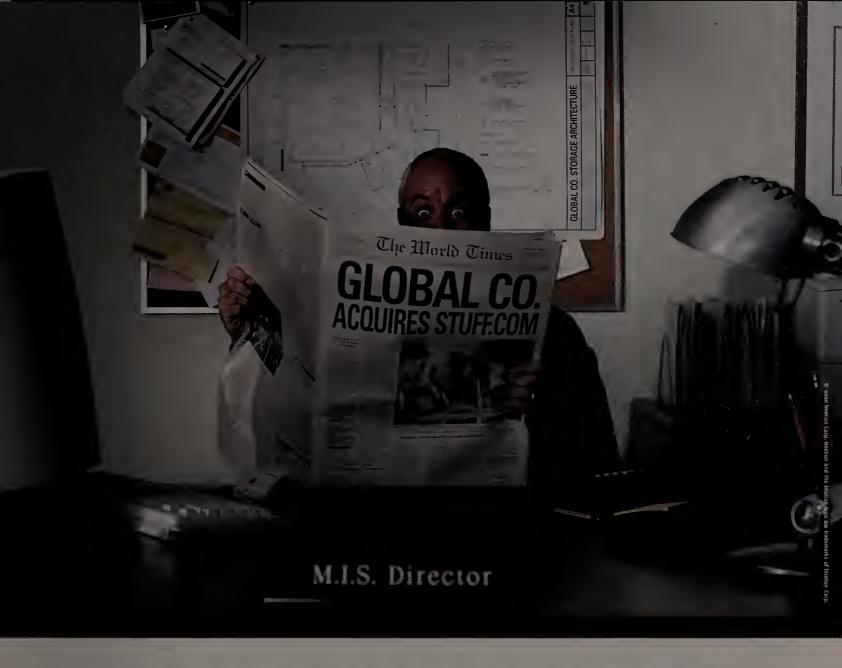
A key to using TCP/IP for storage is resolving the performance issues with TCP. While TCP is very effective in coordinating transmission on the Internet, it consumes considerable computing resources processing each frame, which directly affects performance when handling disk I/O in a local environment. Thus, some sort of processor off-loading is required to get reasonable performance from IP storage, while at the same time guaranteeing in-order receipt of the data. There are a number of approaches being taken to solve this problem, including the use of dedicated network processors (NPUs) or application specific integrated circuit (ASIC) to handle the TCP processing.

Virtual Interface

The Virtual Interface architecture was developed by Intel Corp., Compaq Computer Corp. and Microsoft Corp. to off-load the CPU during file transfers and to significantly reduce latency through:

1. Direct memory-to-memory data transfers that are transport-independent
2. Direct application access to data transfers without operating system involvement

Virtual Interface is currently being incorporated into the new InfiniBand standard and several suppliers are adopting Virtual Interface to run on top of Fibre Channel and on TCP/IP. In addition, a spec is being prepared to run SCSI on top of Virtual Interface over TCP/IP. Vir-

tual Interface is optimized for controlled interconnect environments, however, and thus is not well suited for WAN communications via the Internet.

Direct Access File System

Direct Access File System (DAFS) is a new high-level protocol based on Virtual Interface that is optimized for high-throughput, low-latency, direct application access to shared file servers in a local environment. It has some unique caching, record locking, fail over and security features that are especially suited for clustering and local file sharing applications like Web serving and database applications. A consortium that includes Network Appliance, Intel, Cisco Systems Inc., Oracle Corp. and GigaNet Inc. is driving DAFS. It is being implemented to run independent of the underlying operating system.

InfiniBand

InfiniBand is a PCI bus replacement designed to be a clustering bus for multiple servers to share storage across a very high-performance switched fabric. A consortium including Intel, Sun Microsystems Inc., Dell Computer Corp., Compaq, IBM and Hewlett-Packard Co. is driving InfiniBand. The initial implementations will begin to emerge in 2001. It is expected that InfiniBand will become a dominant data center cluster interconnect but it is not likely to be used as a network bus.

Virtualization

Virtualization is one of the most important emerging storage technologies, since it provides the capability to provision storage resources as needed on demand. This is done in a software layer that sits between the physical device drivers and the file system, providing a virtual volume view that is not tied to specific physical devices.

This virtualization layer presents a pool of resources to the file system that can be managed dynamically, providing data sharing, performance optimization, capacity optimization and data protection. In a SAN environment, the virtualization layer would map the servers to the storage pool at the virtual volume level and thus provide an integrated access framework across all of the SAN resources under its control.

There are several possibilities on how to implement such a virtualization framework across a SAN, but they basically come down to distributing the virtualization control across the servers in the SAN or centralizing control into a single device that resides either in the data path or outside the data path, acting as a metadata server. There are advantages and disadvantages to each implementation, but we believe the winner will be the metadata approach, since it scales the easiest and could eventually be integrated into a router.

Data Sharing

SANs and virtualization techniques address the first level, as described above.

There are a number of new replication techniques that are evolving to address the second level of data sharing, which is important for backup protection, disaster recovery and performance. SANs introduced the capability to do LAN-free backup, (i.e., all backup traffic is on the SAN, not the LAN), which was the first "killer application" for SANs. In addition, server-less backup techniques are now being developed for SANs, where a third-party "data-mover" application takes over the backup task from the file servers and keeps the data backed up in the background on a shared pool of

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Lisa Hart has over 20 years' experience in the storage industry, including 16 years at StorageTek. She has been a guest speaker at several industry and company events. She joined IN_fusion in April, 2000.

You can visit the IN_fusion Web site at: www.in_fusion.net

backup devices. There is still much work to do here, however, to create a truly heterogeneous server-less backup system. In fact, it gets at the heart of the issue with block-based SANs, where the file intelligence sits on the servers and thus only servers with the same file system can read given blocks of data.

To date, no one has completely solved the problem of dynamic data sharing at the file level in a heterogeneous environment, but a number of people are working on advanced global file systems that should start to appear in 2001.

A canonical data interchange format is required to create the truly heterogeneous data-sharing world of the future. The emerging XML standard is likely to win here. There is also work going on in object-oriented storage, where data blocks can be treated like files, enabling the storage device to be an intelligent agent.

A few years ago outsourcing was hardly a consideration. In the future it will likely be the norm for enterprises to outsource their applications, networks and storage to outside service providers. As a result, the number and type of service providers that have surfaced in the last year is astounding, including the following: Application Service Providers (ASPs), Internet Service Providers (ISPs), Managed Storage Service Providers (MSSPs), Network Service Providers (NSPs), Storage Service Providers (SSPs) and even Storage and Application Services Providers (SASPs).

Storage is growing so fast and that is the primary reason it will be outsourced. Very few enterprises can find or afford enough qualified people to manage it. The

Data Sharing

Data sharing among multiple servers can be done at several levels:

◆ Physical or virtual volume level
◆ Data exchange or copy level
◆ File level

complexities of managing separate storage networks only compound the problem. In addition, the up-front investment of moving to new applications and maintaining the appropriate service levels will become the responsibility of the service provider. Data security will become a primary service level metric, along with data availability and accessibility.

Spending in the U.S. between now and 2004 on infrastructure to support Internet-based applications will grow almost ten fold, from $250 billion to $2 trillion, according to IDC. This growth will lead to complexity in the supporting infrastructure and management of this data. Thus the lack of resources and skilled people will cause enterprises to look for service providers to fill this need.

The convergence of service providers and e-business is creating a new model for doing business in the future. As a result, how we buy, sell and deliver goods, services and information will change dramatically.

Summary
There are major information technology shifts and challenges facing network storage. Anytime there are emerging technologies trying to address global paradigm shifts, there are "gaps" in the solutions that can result in business opportunities.▶

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CASE STUDY

Electric Lightwave Connects With HP to Bring Systems up to Speed

Today's tumultuous telecommunications industry is a pressure cooker of burgeoning technology, explosive regulatory changes and aggressive entrepreneurial rivals. As a result, approaches to defining network requirements and selecting vendors and services are becoming increasingly sophisticated. Similarly, telecommunications companies must demand winning service innovation, quality of service and superior customer service.

Transmitting Through Cross Talk

Electric Lightwave Inc., a broadband integrated communications provider of Internet, data, voice and dedicated access services to communications-intensive businesses and the growing online business community, has been expanding at light speed. The company owns and operates high-speed fiber optic networks and operates a national Internet and data network. Headquartered in Vancouver, Wash., the company saw an 85% increase in revenue between 1998 and 1999.

"Six years ago, Electric Lightwave was a small group of people without information technology as a core competency," said Duane Ternes, director of information technology for Electric Lightwave. "Today, there are 1,182 employees and we have tripled our data center size, from just a few basic systems with proprietary software to a multi-level network interface for our sales

team, a new one-stop billing system, a centralized reporting structure and 52 servers across two main data centers." For system administrators, the mix of the company's legacy systems encompassing multiple flavors of Unix and hardware platforms, plus relational databases from Oracle Corp. and Sybase Inc., was a potentially serious hurdle.

"We considered several vendors and did in-depth comparisons of each. HP was, by far, the most responsive in meeting the contracts and service level agreements we set forth," Ternes continued.

Supporting Growth at Light Speed

Hewlett-Packard Co. Consulting began by conducting a system analysis of Electric Lightwave. It identified several factors that Electric Lightwave needed to consider to determine how it could continue to provide reliable service to its customers while supporting anticipated growth. In short, those factors came down to servers, systems, storage and security — and all the payload in between.

Electric Lightwave's national expansion to reach customers outside of its existing network also meant that low-cost solutions were essential in order for the company to meet analysts' expectations of profitability in the next few years — while also building an infrastructure that would support growth. Here again, the

choice of HP servers and operating system contributed directly to the bottom line.

Navigating Networks and Servers

In 1998, with only four or five HP 9000 Enterprise Servers, Electric Lightwave began researching the best products to move the enterprise forward based upon its projected growth. With a goal to introduce more powerful servers to meet the internal requirements for software, Electric Lightwave chose HP-UX as the operating system to support the new infrastructure.

"Our original data center had the capability to grow the company to about 700 employees," Ternes stated. "However, we quickly realized that building a second data center was a necessity. We ultimately tripled the size of our existing data centers with the additions in the main headquarters building."

The facility now houses 52 HP 9000 servers ranging from HP's 9000 D-, K- and N-Class to the largest V2500 series servers.

"At the beginning of the growth period, Electric Lightwave had just a few systems: e-mail, telecom and a small network operation center system. We used PeopleSoft Human Resources and Payroll modules and a Computer Associates International Inc. application for financials," Ternes explained.

Since then, Electric Lightwave has added a new one-stop billing system by Kenan Systems, a division of Lucent Technologies; turnkey software for cost-of-access analysis; and a centralized reporting structure. Electric Lightwave is equipped with a data mart used primarily for financials. To keep the size manageable, Electric Lightwave scrubs data before it goes into the database. Additionally, Detail Systems, a Call Detail Record (CDR) data store accessed by 500-1,000 users, was instituted and is monitored for all new products.

For telecom business solutions, Electric Lightwave opted for the TBS system from Metasolv Software Inc. as an enterprise, telecommunications, provisioning software application. They also selected HP OpenView as their system management solution. HP OpenView IT Operations, Network Node Manager, along with VantagePoint for Unix, enables IT to provide a robust, highly available and scalable network, applications and systems environment.

Taking Off with Storage and Speed

After years of direct-connect service, Electric Lightwave determined the most effective way to manage its many sizeable databases was through attaining more flexibility and performance — and that meant upgrading to a storage area network (SAN). In preparation for this move, Electric Lightwave selected HP's SureStore E Disk Array XP256 with 2.8 terabytes teamed with an EMC Corp. Symmetrix array containing 1 terabyte.

"With a spin rate of approximately 12,000 rpms,

Electric Lightwave Inc.

Headquarters: Vancouver, Wash.
Founded: 1990
Employees: 1,182
1999 Revenues: $187M
URL: www.eli.net

Products/Services: A facilities-based, broadband communications provider offering Internet data, voice and dedicated access services to communications-intensive businesses and on-line companies.

---

the XP256 has the fastest I/O capacity on the market today. This is exactly the performance needed to support our billing system software," said Ternes.

Using SAN architecture, Electric Lightwave will no longer need to add disk to every server independently. As Ternes explained, "We decided to move to a SAN because its flexibility and performance could effectively manage our 100GB to 300GB databases. As the number of development initiatives increased, disk storage requirements are allocated and de-allocated on various servers at a much faster pace. We were at a state where we had disk shortages on one server while we have large amounts of available storage stranded on another."

"The SAN architecture gives us the flexibility to have the storage available to any server and upon project completion it is available for re-allocation to any other server. The performance of Fibre Channel is an added benefit," he said.

"As we researched compatible storage systems, we knew we wanted security and management software. HP offers a SAN management software suite that can integrate directly with all HP products. The platform HP provided allows us to implement this using today's emulated private loop and support the transition to fabric log-in. As we went through the process of selection, it was clear that HP had the lead on all the qualities and capabilities we sought," he added.

With a moderate level of archiving, Electric Lightwave currently has 3.5 terabytes of storage used with a half terabyte still available. To use storage space most efficiently, Electric Lightwave keeps a rolling window of Call Detail Record online for 92 days and archives anything beyond that.

With the XP256 connected to the SAN, Electric Lightwave has positioned itself for the cross platform storage solution it had hoped to attain. Electric Lightwave is actively using the platform with HP-UX servers, and will be expanding its use to begin storing data from the company's Microsoft Windows NT and Sun platforms as well.

"The XP256 was the clear choice for handling existing systems and supporting future growth as it allows for testing, development and production system capability as well as the option to integrate SAN management software," said Ternes. "The technology we needed to support our business systems and software could only be handled by a versatile and powerful storage system like the HP XP256," he continued.

"During the last several years we've experienced a steep growth rate that required an advanced communication platform and products that would best move our enterprise forward," Ternes added.

"HP went out of its way to cost-effectively help us bring our systems up to date. As we upgrade in the near future to offer new services to our customers, HP performance, reliability and expert service, along with the SAN technology, will help us remain competitive in the increasingly crowded communications arena," he added.

Final Impact

"Information technology is the main strategic weapon for companies in the future and telecommunication plays a critical role," said Ternes. "The equipment and service providers at the core of the industry understand the vital need for system reliability and stability. HP responds better than any other vendor I have worked with and they have repeatedly proven to be the best in performance, scalability and service."▶

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All That Really Matters is High-End Storage

One of the many questions stumping scientists is how matter is created. At the Fermi National Accelerator Laboratory in Batavia, Ill. that question and many others are being explored so some day we may have the answers.

The Fermi National Accelerator Laboratory is part of the U.S. Department of Energy. Approximately 2,300 scientists and engineers from all over the world collaborate in various experiments to gain a deeper insight into the fundamental structure of matter.

One of the experiments being conducted is the Collider Detector at Fermilab (CDF), which is a large particle detector system used to research and study particle interactions. The previous CDF experiment, termed Run I, recorded several terabytes of data. The upcoming collider run, termed Run II, is expected to record more than 20 times the amount of Run I.

Large Volume of Data — Limited Budget

In order to store and analyze the data generated by Run II and stay within the project's budget, a cost-effective data storage system was needed. Fermilab had to implement a cost-effective yet high-performance system to manage its research data. The data storage system installed for Run I performed well for the amount of data recorded but was not expected to efficiently accommodate the data in Run II, which is set to begin in March 2001. Run II will need to accommodate a much larger amount of data than Run I. During the two-year data-taking period, the collider is expected to record 1 petabyte of data.

There were many challenges that a storage system needed to address. One hurdle was allowing every scientist involved in the project access to various portions of the data generated throughout the two-year experiment, depending on the scientist's particular research focus. The ability to share data will increase the lab's ability to efficiently store and analyze the data. This led Fermilab to implement a Storage Area Network (SAN).

SANs' Challenges and Solutions
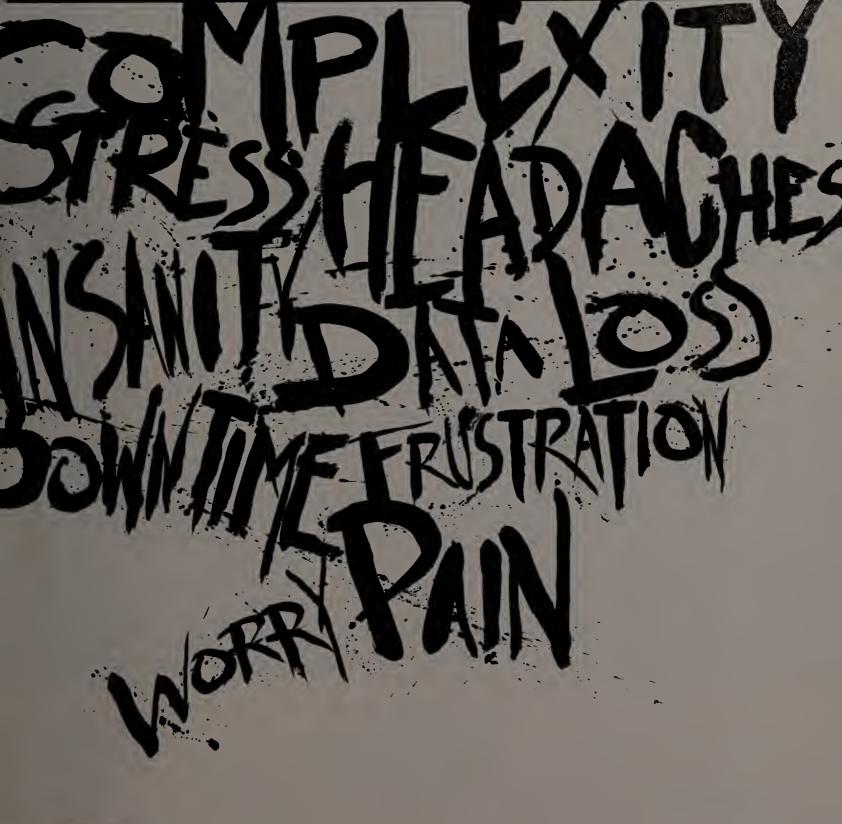
Challenge	Solution
◆ Many scientists needed access to the system	◆ A shared user login and authentication area will provide access to the analysis system from desktops
◆ It needed to be inexpensive and flexible	◆ SCSI support
◆ It needed to support an unlimited number of devices and be fast	◆ Fibre Channel support

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DataCore
S O F T W A R E

Run II consists of a central analysis system pooling over 20 terabytes of disk space and supporting an automated tape library with storage capacity for the expected 1 petabyte of data to be generated during the two-year experiment. The storage pool is surrounded by loosely clustered, multi-processor computer systems. A shared user login and authentication area will provide access to the analysis system from desktops.

The storage sub-system for Run II relies upon SCSI and Fibre Channel technologies. SCSI offers an inexpensive, flexible means of storing data, but is limited by the number of devices and distance that it can support. To overcome these issues, Fermilab implemented Fibre Channel technology to take advantage of its increased speed and its ability to reliably support an unlimited number of devices. Fibre Channel provides high bandwidth over distance to accommodate the large facility and allow scientists to share and access data simultaneously.

Fermilab installed 22 RAID units, each equipped with a Chaparral K7413 RAID Controller and connected to the main subsystem over several Fibre Channel loops. The Chaparral RAID controller is a key element of the Fermilab SAN supporting hundreds of disks in the system, a highly robust configuration. The Chaparral RAID controller provides the reliable conversion of SCSI to Fibre Channel.

Fermilab uses a fault-tolerant RAID-3 level setup, which offers the highest data transfer rate and allows hot-pluggable disk replacement without bringing the system down by placing the data across three or more drives. The Chaparral K7413 RAID Controller provides the high-speed, seamless connection between SCSI and Fibre Channel.

Customer Reaction

Stephan Lammel, associate head of the Collider Detector and physicist at Fermilab, is co-leading a team of computer engineers and physicists to design, implement and test the data handling and analysis systems for the Collider Detector experiment. Lammel was charged with the task of implementing a cost-effective, reliable means of storing and managing the data.

Lammel holds a Ph.D. from the University of RWTH in Germany. Previously, he carried out experiments at the European Center for Elementary Particle Research at CERN in Switzerland before joining Fermilab.

"The effectiveness of the research at Fermilab depends largely on our ability to organize, access and store the vast amounts of data collected by the experiment.

Specifically, Chaparral K7413 RAID Controllers provide the fault tolerance Run II needs to keep the CDF system up and running and to ensure continuous, high-speed data movement. Chaparral RAID controllers also convert SCSI and Fibre Channel bridging the two technologies to enable Fermilab to take advantage of the low cost of SCSI and to benefit from the speed and bandwidth of Fibre Channel."▶

> To overcome these issues, Fermilab implemented Fibre Channel technology to take advantage of its increased speed and its ability to reliably support an unlimited number of devices.

NEWS OPINION

GEOFFREY JAMES

How companies court disaster in outsourcing deals

THE DAYS ARE long gone when top executives were so computer-illiterate that they refused to have a computer on their desks. But there's still an impressive amount of executive stupidity floating around. That's particularly true when it comes to outsourcing, especially when such deals go sour.

Problems in outsourcing deals are far from unusual. According to a recent Dataquest study, more than half (53%) of all outsourcing customers report having renegotiated a contract, and in nearly one-quarter of these renegotiations, the vendor lost the account.

As a result, litigation and arbitration over failed outsourcing agreements is now a big growth area in computer law, says attorney Tobey Marzouk, a partner at Marzouk & Parry, a Washington law firm that specializes in such cases.

A big source of outsourcing failures is the way that outsourcing vendors tend to "sell high," pitching their projects to the CEO rather than to the IT staff and managers. One of the perversities of corporate culture is that outside experts are often more respected than inside talent, and thus many projects get sold to top management, which then pushes the IT group to go along even when IT knows that the project is impractical.

Another common piece of stupidity is top management's refusal to hire a lawyer who specializes in outsourcing litigation during contract negotiations. While it's true that many companies have legal staffs, software litigation is a relatively new field, and few lawyers have either the legal or the technical training to understand the issues involved. Outsourcing contracts must be written carefully so that they identify exactly how performance will be measured, with clear acceptance standards and testing procedures. "That way, you can hold the vendor's feet to the fire to make sure problems are fixed," says Marzouk.

When failed outsourcing projects end up in court, the knee-jerk reaction of top management is sometimes to fire the IT manager who was the project liaison. That's monumentally stupid, according to James Standish, CEO of The Standish Group International Inc., a research organization in West Yarmouth, Mass. He tells the story of one small company that "paid the vendor $20 million and found out that the resulting system not only wouldn't work, but that it would cost $20 million a year to keep running." The IT director — a former employee of the vendor — was subsequently fired. But when the case went to court, the former director appeared as a hostile witness, causing the company to lose its lawsuit.

Another common error is shutting down the flawed system before the case goes to court. While that can save a few dollars in maintenance costs, the IT group may need to have the system available in order to identify the problem and articulate it clearly to the court. "The best way to prove that the software doesn't work is by showing that it doesn't work," points out Marzouk.

This isn't to say that outsourcing is always a bad idea, only that top management needs to listen more closely to its own technical staff before making outsourcing decisions. Now isn't that a radical idea? ◗

ANDREW BARTELS

The difference between e-business and e-commerce

E-BUSINESS AND e-commerce are terms that are sometimes used interchangeably, and sometimes they're used to differentiate one vendor's product from another. But the terms are different, and that difference matters to today's companies.

In both cases, the e stands for "electronic networks" and describes the application of electronic network technology — including Internet and electronic data interchange (EDI) — to improve and change business processes.

E-commerce covers outward-facing processes that touch customers, suppliers and external partners, including sales, marketing, order taking, delivery, customer service, purchasing of raw materials and supplies for production and procurement of indirect operating-expense items, such as office supplies. It involves new business models and the potential to gain new revenue or lose some existing revenue to new competitors.

It's ambitious but relatively easy to implement because it involves only three types of integration: vertical integration of front-end Web site applications to existing transaction systems; cross-business integration of a company with Web sites of customers, suppliers or intermediaries such as Web-based marketplaces; and integration of technology with modestly redesigned processes for order handling, purchasing or customer service.

E-business includes e-commerce but also covers internal processes such as production, inventory management, product development, risk management, finance, knowledge management and human resources. E-business strategy is more complex, more focused on internal processes, and aimed at cost savings and improvements in efficiency, productivity and cost savings.

An e-business strategy is also more difficult to execute, with four directions of integration: vertically, between Web front- and back-end systems; laterally, between a company and its customers, business partners, suppliers or intermediaries; horizontally, among e-commerce, enterprise resource planning (ERP), customer relationship management (CRM), knowledge management and supply-chain management systems; and downward through the enterprise, for integration of new technologies with radically redesigned business processes. But e-business has a higher payoff in the form of more efficient processes, lower costs and potentially greater profits.

E-commerce and e-business both address these processes, as well as a technology infrastructure of databases, application servers, security tools, systems management and legacy systems. And both involve the creation of new value chains between a company and its customers and suppliers, as well as within the company itself.

All companies should have an e-commerce strategy. (Governments should have an e-public service strategy.) Electronic networks in general and the Internet in particular are too important for firms to ignore if they want to interact with customers, suppliers or distribution partners.

But some companies need to move beyond e-commerce and form e-business strategies — especially large companies that already have links to EDI networks or have completed major ERP implementations. These companies have already reaped some of the biggest benefits from e-commerce strategies. They're also likely to experience organizational pain as conflicts develop among their ERP, EDI, supply-chain management and e-commerce strategies. And last, they have enough experience and knowledge in electronic-network technologies — and in process redesign and integration — that they have a chance of being successful in an e-business strategy.

Still, the coordination and organizational obstacles to developing an e-business strategy are formidable. It involves major and potentially disruptive organizational change. The risks of failure and the consequences from limited success are higher in an e-business strategy than in an e-commerce strategy. Being a leader in e-business can contribute to long-term success, but the stresses and strains of business transformation can cause near-term damage.

A wise company may decide to consolidate its gains and complete the work involved in its existing and largely separate e-commerce, ERP, CRM or supply-chain initiatives before making the big leap to becoming an e-business. Jumping too soon can be as disastrous as moving too late. ◗

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four aces. Then again,
it could be a pair of threes.

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BUSINESS

DELIVERING THE REAL GOODS

The biggest names in online retailing have spent much of the past year fixing the order-fulfillment problems that plagued them last holiday season. But analysts say the pressure is even greater this year because customers don't just want their products on time; they expect the entire online shopping experience to be trouble-free. ▶ 48

SHARING THE WEALTH

Silicon Valley as a model for wiping out mass poverty? Sure, it sounds crazy to those who populate the elite streets of the San Francisco Bay area, but after spending a morning with T. H. Chowdary of India, *Computerworld*'s Pimm Fox says it makes perfect sense. ▶ 48

SECURITY TEST

At the National Security Agency, all employees must pass a test demonstrating a basic knowledge of security procedures. But while security experts agree that such knowledge is critical for most, they disagree on the effectiveness of testing. ▶ 50

TAKING OFF

Two years ago, Keith Palmer landed a plum temporary job on the help desk at NASA contractor United Space Alliance. Since then, Palmer has been tapped as the employee of the year by two national

staffing services and he won the NASA Space Flight Awareness Award. He also turned his temp gig into a permanent information technology career. ▶ 52

OUTSOURCING THE SAFE WAY

Considering an application service provider (ASP) for outsourcing business or e-commerce applications? Well, you'd better be sure the ASP's security precautions suit your business needs. Then make sure your own security requirements are captured in writing. ▶ 58

COMMUTING HORRORS

The job market is booming, and IT workers are in demand. Many are willing to hit the road for the right job, but some of the best IT job markets are in the nation's biggest metropolitan areas, where the traffic can prove to be a nightmare. ▶ 60

LEAVING YOUR MARK

David Sims gave independent consulting a shot for two years. He wanted his work to leave a lasting imprint, however, so he created a new Java software component. Almost two months after the component's debut, Sims is finding that product development takes on a life of its own. ▶ 62

BORDERS GROUP'S Charlie Moore says interactive technologies are "increasing the potential for the customer to interact with a human being"
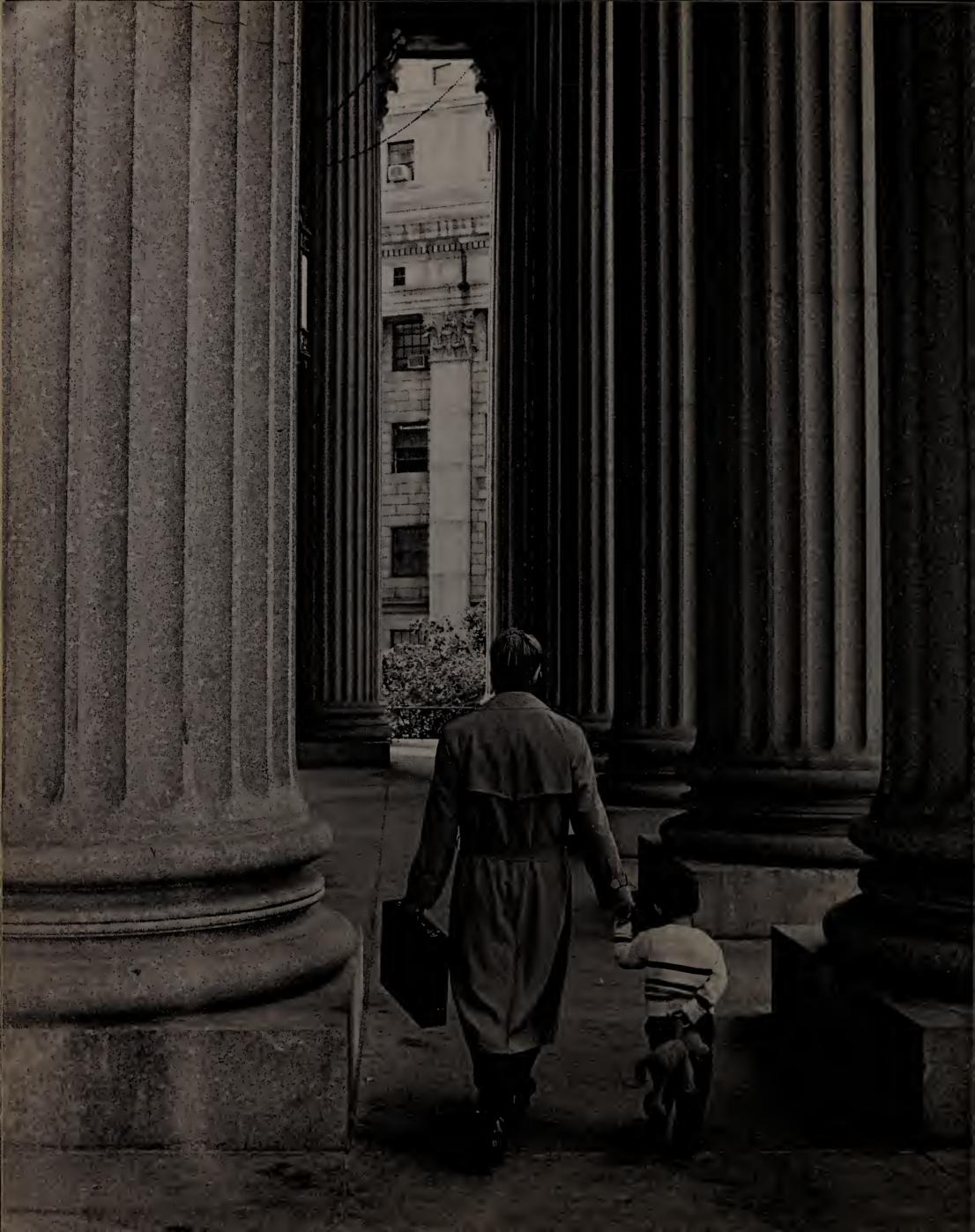
THE REAL DEAL ON SERVICE

IT'S SINK OR SWIM. If a customer can't get an answer to an inquiry at your site, he can go straight to your competitor with the click of a mouse. So to keep up with Web customers' growing demands and sophistication, many companies are racing to add easy-to-use, real-time communication features such as live chats and collaborative browsing. **56**

ANNOUNCING SOLUTIONS FOR THE *NEW*, NEW ECONOMY.

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THE PROFITABLE ONE.)

The promise of e-business is every bit as robust today as it was when the "new economy" was declared. It's just that things that were labeled passé and irrelevant when IPOs were soaring have returned with a vengeance – planning, infrastructure, even profitability are back in fashion. Welcome to the new "new economy." No company is better suited for this world of value-oriented e-business than SAP. We have the best solutions for collaboration, supply chains, improving customer relationships and generally adding value to a company's business proposition. Out with the "new." In with the "new new." Type in www.sap.com

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'Tis the Season to Build Long-Term Loyalty Online

E-retailers have more than just fulfillment on their holiday to-do lists

BY DAN VERTON

When Santa Claus asked the dot-com world last year for help in delivering the more than $5 billion in holiday goods purchased online, a lot of big industry players forced him to deliver thousands of IOUs instead of gifts.

Online retailers have had a year to fix those fulfillment problems in time for what's expected to be the biggest holiday season yet for Web sales — as much as $19 billion, according to a recent forecast by Stamford, Conn.-based Gartner Group Inc. But that's not the only thing on Web retailers' to-do lists: Those that fail to focus on customer satisfaction and loyalty this year won't have next year to worry about, say both analysts and users.

"Last year, it was about handling capacity," said Kevin Tate, vice president of business development at Fort Point Partners Inc., a business strategy consultancy in San Francisco. "This year, we're going to see if sites turned the customers who shopped into long-term, loyal customers."

Mike Wagner, chief operating officer at Denver-based KBkids.com Inc., is taking that forecast seriously.

"If a customer does not have a good fulfillment experience, they will not be back," said Wagner.

Fulfillment means more than just shipping on time (see chart). It refers to the whole online buying process, say experts, from finding products, getting online assistance and purchasing items to getting assurances from vendors that the products ordered come with a guarantee of on-time delivery.

Aamir Rehman, senior analyst at e-commerce consulting firm Creative Good Inc. in New York, recently ran a user study that critiqued eight of the Web's most popular retail sites — Amazon.com, Barnesandnoble.com, Buy.com, Landsend.com, Gap.com, BestBuy.com, eToys.com and KBkids.com — and found that 43% of all online purchasing attempts fail.

Participants in the study said they often became frustrated by confusing account registration requirements, vague error messages that offered little or no help on how to proceed and an inability to order more than one item.

"It was as if these customers made it to the cash register, but the store would not let them pay," said Rehman.

Despite the recent flap about its pricing and privacy policies, Seattle-based Amazon.com Inc. did relatively well on Rehman's study.

"We take holidays very seriously," said Amazon spokeswoman Kristin Schaefer, adding that this will be the first year that all of Amazon's eight regional distribution centers will be in operation.

One of the major pitfalls for many companies online, however, is that they try to be everything to every customer, said Tate. Sites should figure out which customers they want business from and go after them, he said.

If they don't, he added, "the result is that they end up being nobody's first choice."

PIMM FOX/VOICE FROM THE VALLEY

Bill the role model

FROM THE CENTER for Telecommunications Management and Studies in Hyderabad, India, T.H. Chowdary sees a highway of IT opportunity stretching all the way to Silicon Valley — a source of wealth creation and entrepreneurial zeal.

"We want to produce IT professionals," Chowdary said during a visit to San Francisco last week. "This is our national policy."

Chowdary, who directs the center and serves as the IT adviser to the government of the Indian state of Andhra Pradesh, says he believes that the relationship between centers of learning and businesses can be the mechanism for eliminating illiteracy and poverty, and he stresses that Silicon Valley is the role model for just such a scenario.

Silicon Valley as a mechanism for eliminating poverty?

The same place people point to as ground zero for the overrich, over-hyped, under-30 billionaire? Where seven of the 10 most expensive housing districts in California are located, and the median price of a home, according to the California Association of Realtors, is $820,500?

Chowdary takes a benign view of this excess. He describes a policy in which the wealth afforded by IT's top employers can serve as the foundation for heightened societal and economic prosperity for the masses. The theme of this policy: "I want to be Bill Gates."

"We would be very happy to have him relocate to India," Chowdary says with a laugh.

PIMM FOX is *Computerworld*'s West Coast bureau chief. Contact him at pimm_fox@computerworld.com.

Putting Web Security Know-How to the Test

Experts debate the value of quizzing on security measures

BY PATRICK THIBODEAU
BALTIMORE

AT THE National Security Agency (NSA), the U.S. government's secretive communications intelligence-gathering arm, employees are required to pass a test to show basic understanding of information security policy and procedures. Failing the test may result in a loss of an e-mail account and system-access rights.

It's no idle threat, said U.S. Air Force Col. John Whiteford, deputy CIO at the NSA. All employees — from the director on down — must complete the Web-based information security training course, which is followed by a 25- to 30-question, multiple-choice online test. Employees who fail must take the test again until they pass. So far, no one has lost access rights, said Whiteford.

"We expect [NSA employees] to have basic competency and security awareness," said Whiteford. "We insist that our employees pass the test."

The NSA started the program about 18 months ago as part of general program to improve information security.

It would have been difficult to find disagreement among the security professionals attending the recent government-sponsored National Information Systems Security Conference here on the need to provide employees with some basic information security knowledge. But finding agreement on the value of taking a test to prove that you have those skills was something else altogether.

The NSA's security testing plan is "certainly better than nothing," said Jon David, assistant vice president for security engineering at Lehman Brothers Holdings Inc. in Jersey City, N.J. But, he added, online tests are ripe for abuse; an employee could seek the help of a friend, for example.

While requiring such a test may be appropriate in the NSA culture, David pointed out that

Getting Testy?

Is testing the best way to ensure that employees understand basic information security practices?

PRO: Testing provides a clear metric and a goal for the employee.

CON: Employees could cheat or may resent having to take a test.

in a more traditional work environment, there's a risk that an employee might resent taking the test "and deliberately not help afterward."

Eugene Spafford, director of the Center for Education and Research in Information Assurance and Security at Purdue University in West Lafayette, Ind., said testing has its limits.

"The key to good education of any kind is practice and repetition," he said. Testing "is the weak link in most self-paced instruction. If you don't go back and repeat the testing or repeat the previous material, there is a danger that you lose some of that."

David said his goal is to ensure that all employees are aware of basic security practices, such as protecting their passwords or not leaving their machines on while they're away from their desks. He said he prefers to rely on employee professionalism to instill compliance, but he also has system-monitoring tools and logs to keep an eye out for security breaches.

"I like professionalism and Big Brother," said David.

But some tests are effective. The U.S. Justice Department has been using penetration testing to improve its security procedures and to search for vulnerabilities. The testing is raising management's awareness of the need for good security, said Linda Burek, deputy assistant attorney general for information resources.

The penetration testing results "scare [senior managers] quite a bit," Burek said. "That has been one of the most effective things we have done." ▶

Valley

That's a great contrast to the sometimes jaded view of IT as a get-rich-quick scheme based on exit strategies, lockup periods and monopolistic practices.

Chowdary's goal for India's future is to produce intellectual capital to man the engine room of the global IT revolution. His avuncular appearance (gray suit and green sweater in a pattern that looked a little like white ducks) doesn't distract from his passion for free trade, less taxation, less government interference and greater reliance on the private sector for jobs.

In the past four years, the number of IT companies based in Hyderabad — dubbed "Cyberbad" by Chowdary — has jumped from four to 1,100, while Andhra Pradesh's export income in IT has risen from $1 million to $500 million.

With Silicon Valley already home to Indian entrepreneurs, engineers and even some venture capitalists, it's not surprising that Chowdary's ebullient call to support and fund computer education in India receives a warm reception.

Venture capitalist Kanwal Rekhi has put part of his fortune into The Indus Entrepreneurs, a nonprofit support network to help nurture start-ups in India.

But even as someone who was the first in his family to be educated, Chowdary is quick to point out that there is something he wishes to teach Silicon Valley.

"Money is essential," he says, "but it is not the only thing. Money without spiritual consciousness is nothing. You must contribute something to the planet. Ethics and morality are part of creating wealth."

Interesting that it takes someone from halfway around the world to point out the true worth of what we have right here at home. ▶

Blasting Off With Aerospace Temp Job

An aerospace enthusiast, **Keith Palmer** jumped at the chance when he saw a newspaper advertisement for a temporary information technology assignment at NASA contractor United Space Alliance (USA) in Houston.

That was more than two years ago. Since then, the once-unemployed Palmer has won three awards for his performance. Most recently, he was named National Temporary Employee of the Year by the American Staffing Association in Alexandria, Va.

The temporary assignment evolved into a full-time job at USA, where Palmer has provided technical support to more than 5,000 NASA staffers, written software programs and worked in production control at the Kennedy Space Center in Cape Canaveral, Fla.

PALMER: Temps can try new jobs without risk

Karen Delaney, an area representative at Olsten Staffing Services in Melbourne, Fla., which placed Palmer at USA, said her agency nominated him for the employee of the year award because of his "strong work ethic."

"We received wonderful accolades from customers USA dealt with," she added.

Palmer recently spoke with *Computerworld's* **Julekha Dash** about his work at USA and the temp job that helped him get his foot in the door.

How did it feel to get this award? I was stunned at first. . . . I was like, holy cow. I didn't even know I was nominated.
Why do you think you were chosen for this award? It all started when I got the [NASA] Space Flight Awareness award. When I got that, Olsten announced that I was their employee of the year. My supervisors [at USA] opened doors for me and let me learn a lot of everything that goes on there.
How long have you been interested in aerospace? Since I was a boy. My dad used

to work on aircraft engines. That atmosphere stuck with me. I used to take my kids out and we'd launch model rockets.
Where did you work before USA? I was unemployed for six months. Before that, I took a stab at running my own business, which didn't work out.
What kind of business? I wrote software for utility companies to help automate business processes.
Why do you think you received the Flight Awareness award? When I was working on the help desk, people were calling on different programs that were outdated. I offered to rewrite the code [and] rewrite the whole program. That's how my name got passed around.
So your first assignment was on the help desk? That's correct. I worked on the help desk for about a year. Then I got promoted to production control. I was in charge of backups for NT and Unix platforms.
What's your role now? I'm a backup administrator. Now I'm working on a team for some new enterprise management tool for monitoring the network, the hardware and software. I'm still writing code for automating a lot of our backup processes.
Are there advantages to being a temporary employee vs. a staffer? It allows people to look into an industry, like I did, and try it out without risk. . . . [But] being a USA employee has a little bit more security.
What are some misconceptions that people have about temporary work? A lot of people don't think that there are benefits. The company I was working for had benefits. They gave you a base pay, then extra pay for benefits.
How do you land a good assignment as a temp? Go to more than one agency. If you get your name into a number of them, that'll broaden your choices.

MICHAEL GARTENBERG

Myths behind TCO

I HAVE LONG MAINTAINED that working in an IT department can result in a net gain of zero. Too many IT professionals spend most of their time doing two things: trying to stay off the obituary page and occasionally trying to make the headlines. An understanding of total cost of ownership (TCO) is a good way to make that front-page story and get noticed in a positive way.

TCO is receiving increased attention today as organizations realize that distributed computing operations are expensive and require a strong, integrated set of management processes. A TCO study can provide the necessary structure to begin building those processes. A proper study can also serve to make senior management aware of the complexities of distributed computing and help justify budget and staffing requirements.

Developing a specific TCO for your business is one way to make the budgetary case. Your finance department should be included in the process to define the cost of ownership so it can see the reality of distributed computing operations and increase the likelihood that it will become a strong ally for supporting the additional

IT funding needed to better manage expenses. In short, without a clear understanding of TCO, an IT organization faces eventual disaster and possible extinction.

Having worked on TCO initiatives as a Gartner analyst, I often saw clients make fundamental mistakes in their analyses and come to erroneous conclusions. The key to a successful TCO study is to avoid the pitfalls. The way to do that is to understand the following common myths associated with TCO:

■ **You need to match someone else's numbers.** No. Mileage varies, and enterprises should use TCO models to perform their own analyses. Don't take someone else's numbers as being valid for your organization. There are no standard TCO numbers that matter except the specific costs to your organization. TCO tools are a good starting point but only that. No one can tell you your costs except you. Remember that models are valid for creating assumptions, not final costs.

■ **First and foremost, TCO is about technology.** Wrong. TCO is more about philosophy and best practices. Technology is an enabler, not an endpoint.

For example, Microsoft advertises that Windows 2000, as a platform, has a lower TCO than prior versions. Clearly, deploying Win 2k doesn't cause your laser printer to start spitting out $20 bills, so what's the secret? Easy. Win 2k simply has more out-of-the-box technology that helps with manageability, and it's those tools that help lower costs. But deploying a new operating system that promises a lower TCO, without enabling the

Myth No. 2: The total cost of ownership is about technology.

management features that actually control costs, can actually lead to cost increases.
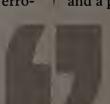
■ **The platform with the lowest TCO is always the best choice.** Never. As an analyst, I was often asked what platform had the lowest TCO. My answer was always the same, "A yellow pad and a pencil."

The cost of a given platform might very well be expensive, but it needs to be balanced against the potential return on investment. Yellow pads and pencils are cheap but not when you need to collaborate with someone on the other side of the world. The platform with the lowest TCO may not be the best match for end-user requirements.

Lowering TCO is really about management philosophy combined with the technology that enables it. Lowering TCO doesn't involve shortcuts or magic.

If you're thinking about doing a major operating system installation or migration, start by evaluating tools and hardware that reduce costs, such as remote or unattended installation and setup. Also, consider the use of policy managers for greater consistency and supportability, as well as software healing-and-repair tools for problem resolution and recovery. Avoid the myths and lower the costs.

Now go out and make some headlines. ▶

Gartenberg, former vice president and research area director at Stamford, Conn.-based Gartner Group Inc., is looking for the next generation of Internet technologies. Contact him at michael.gartenberg @mindspring.com.

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THE *CABANA GUY* INTERRUPTS THIS VACATION TO SAY, "IT'S FOR YOU."

The corporate counsel is really, really sorry.

"I hate to bother you with this," he says,

"but we really need some transaction

records, and IT says there's a problem."

Six cell calls later, an IT guy says there's

a problem: there are no transaction records.

"We used to do backups at night," he says.

"Now on the Internet, there is no night.

And no good time to do it." The good news:

seat 31B on the red-eye is available.

THAT'S WHEN IT HITS YOU. YOU ARE *SO READY* FOR IBM

Savvy Internet shoppers are driving e-commerce firms to adopt real-time communications technologies.

By Minda Zetlin

TECHNOLOGY ANALYST BOUGHT A house that came with a clothes dryer made by a brand-name manufacturer. The lint screen in the dryer was torn, and the analyst went to the manufacturer's Web site to purchase a replacement.

He couldn't find what he wanted on the site, but there was a note posted promising that the company's customer service department would respond to all e-mails within 48 hours. So the analyst dashed one off.

More than a year later, he still hasn't received a response.

Experiences like this aren't always typical of Web-based customer service, but they're common enough to make many online customers skeptical about waiting for an e-mail response to an inquiry. And today's Internet shoppers are increasingly sophisticated, have more complex questions and want the immediate satisfaction that only real-time responses can provide.

Increasingly, shoppers expect instant customer service via a toll-free number, live text chat or other real-time response.

Come Talk to Me

While studies from Cambridge, Mass.-based Forrester Research Inc. show that e-mail remains the primary means of communicating with customers for the vast majority of e-commerce sites, more and more e-businesses are either adding new functionality or making plans to do so soon. "Because of what the Internet has provided in the last five years, demand has definitely shifted," notes Oliver Deschryver, chief technology officer at DHL Airways Inc. in Redwood City, Calif.

"At this point, the customer wants to control the interface with the company. That demands some

The Costs of Customer Support

Forrester pegged the average cost of answering customer inquiries via five channels of customer support:

CHANNEL	COST	ANNUAL GROWTH RATE	% OF INCIDENTS HANDLED VIA THE CHANNEL TODAY	% OF INCIDENTS HANDLED VIA THE CHANNEL 2002**
Telephone	$33	90%	54%	13%
E-mail	$9.99	111%	9%	4%
Chat*	$7.80	N/A	<1%	4%
Message board*	$4.57	178%	<1%	2%
Knowledge base/Web	$1.17	407%	37%	87%

*Low penetration among firms reporting   **Projected

changes within your system — and a lot of changes within the corporate culture," Deschryver says.

DHL offers contact with its customer service representatives only via e-mail or phone. But Deschryver says adding text chat and collaborative browsing are "definitely part of the strategy" and should be implemented within a year.

Although installing real-time communications technologies such as live chat and collaborative browsing can cost organizations upward of $4,000 for each customer representative station, the payoffs can be dramatic. A report from Forrester released last December placed the average cost of answering a customer's call to a toll-free call center at $33. In contrast, it costs organizations just $10 on average to answer a customer's e-mail (see chart above).

"One of the benefits to chat is that a service rep

E-CUSTO
SER
GETS RE

can handle three to five chat sessions at a time, as compared to only one phone call," notes David Daniels, an analyst at Jupiter Research Inc. in New York. He adds that his research has found that most companies are using application service providers to host their text chat. Fees range from $350 to $750 per month per service representative using the technology, Daniels says.

Building on Experience

Some early adopters of real-time technologies are the e-commerce components of brick-and-mortar businesses that built their reputations on customer service. One is Seattle-based Nordstrom.com, which launched text-based chat and collaborative browsing a month ago — along with "swatching," which allows Web users to view the exact colors of fabrics.

"Hopefully, it'll improve our sales, but more importantly, it will improve our customers' experience," says Paul Onnen, the company's chief technology officer.

Nordstrom Inc. has built its entire brand around its legendary customer service, which helps explain why Nordstrom.com has invested what Onnen terms "a substantial amount" in new real-time technology.

According to the Forrester study, the best way to drive down customer service costs is to answer questions before customers pose them. The study found that "knowledge-based" contact — when a customer looks in a Web site's frequently asked questions (FAQ) section or executes a search to find an answer to a question — costs companies only about $1 per interaction.

"There are companies that are monitoring call center transcripts and chat logs to anticipate customer needs," explains John Dalton, a Forrester analyst. "They have a team that reviews customer needs and updates their FAQ [pages] based on the top

BORDERS GROUP'S Charlie Moore: "We know from our call center that when customers call us, they spend more money than when they just order online"

questions of the week. They're actively mining this conversation."

Companies cited in the Forrester report as being particularly savvy at providing solid knowledge-based information on their sites include Atlanta-based United Parcel Service of America Inc. and Delray Beach, Fla.-based Office Depot Inc.

Do's and Don'ts

Executives whose companies are using real-time technologies say they believe the systems will pay for themselves. These technologies are "increasing the potential for the customer to interact with a human being," says Charlie Moore, director of customer service at Borders Group Inc., the Ann Arbor, Mich.-based parent company of the Borders Books and Waldenbooks chains.

"We know from our call center that when customers call us, they spend more money than when they just order online," he explains. "Part of that is because we're able to help them find what they're looking for."

Information technology executives also offer some cautions when using these new technologies. For starters: Make sure everything you do is customer-driven, not technology-driven. For instance, says Moore, Borders considered and rejected technology that would send an e-mail to any customer who had abandoned his online shopping cart while visiting the Borders site and inquire why the shopper didn't complete the transaction.

"Our customers wouldn't like that," he explains.

Practitioners also say it's best to introduce a new technology slowly and in stages, in order to ensure that everything is working properly. Dalton says that during last year's holiday shopping season, he tried text-based chat customer service at various e-commerce sites and was unimpressed with what he found. "It was amazing how slow it was and how cumbersome," he recalls. "Sometimes the chat box would disappear, then reappear after I'd left the page." At other times, during collaborative browsing, says Dalton, the customer service representative would send him to the wrong Web address.

Concerns like these are why eNationwide, the online arm of Nationwide Insurance Cos. in Columbus, Ohio, is moving cautiously as it enters the realm of real-time online customer service, according to Steve Tien, associate vice president at eNationwide. The company can now provide quotes and binding contracts over the Internet in several states, including Texas, California and Illinois.
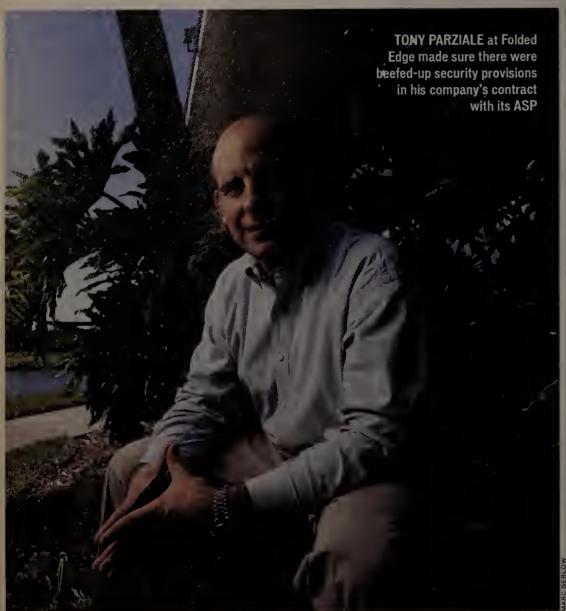
Nationwide has already determined that live chat on the site would be a worthwhile investment. "Lots of folks like the immediate gratification of this environment, especially if their inquiry is a simple one," Tien says. "So if it can be provided within a defined cost structure, we feel we'd need to go after it."

Nationwide hasn't yet completed its cost analysis for live chat, says Tien. The company's concern isn't over the cost of software, which he says is affordable, but over increased staffing needs.

"When you're messing around with customer service, you're basically messing around with dynamite," he says. "Changing the service aspects of the site will impact the policyholders we already have. Just throwing things out there to see how they go isn't necessarily the right idea, because if they don't go right, you create frustration. And that does us more harm than good." ▶

Zetlin is a management writer and author of Surviving the Computer Time Bomb *(Amacom Books, 1999).*

TONY PARZIALE at Folded Edge made sure there were beefed-up security provisions in his company's contract with its ASP

MARC BERLOW

Thinking ASP?
DON'T FORGET SECURITY!

Before you sign a contract with an ASP, don't forget to scrutinize its commitment to keeping your organization's data secure. By Deborah Radcliff

I F THE RAPID CONVERGENCE of business and the Internet isn't enough of a security threat, there's now a new bugaboo keeping information technology managers up at night: application service providers (ASP).

"You've now got a third party responsible for the integrity, confidentiality and availability of your data," says Pete van de Gohm, director of information asset protection at Enron Energy Services Inc. in Houston.

Once an organization has handed its applications over to a third party, its biggest concerns include who's handling and accessing that data and what guards the connections from the outside, says Amit Yoran, CEO of RipTech Inc., a security services firm in Alexandria, Va. "ASP users are worried about the connectivity from the customer to the ASP and how that's protected from the Internet," he says.

While ASPs say they won't offer any guarantees, many put standard security offerings in their contracts, such as firewalling and traffic monitoring. But those who want to earn the business of the Fortune 1,000 companies are also agreeing to contracts with specified custom security requests for additional fees, such as scanning the content of incoming mail, setting up and maintaining virtual private networks or managing firewall and intrusion detection services.

"Some ASPs are looking at the big picture," says Mitchell Hryckowian, senior director of security and infrastructure at Interliant Inc., an ASP in Purchase, N.Y. Interliant, for example, appends its contracts with a security clause to provide basic traffic monitoring services. In addition, high-end customers can demand — and receive — customized security services be added to their contracts.

The Threat

Tony Parziale, chief technology officer at online fashion retailer Folded Edge Inc. in Duluth, Ga., negotiated for customer-centric security clauses with his ASP, now-defunct Pandesic LLC in Sunnyvale, Calif. [Page One, Aug. 7]

"Security clauses in the initial Pandesic contract were very vague," Parziale says. So he worked out service-level agreements for customer credit-card security on transactions and data security for Folded Edge's SAP modules in addition to setting minimum access and connectivity requirements.

Because his ASP partnered with several back-end service providers, getting these assurances was complex. For example, Intel Online Services in Santa Clara, Calif., set up Folded Edge's frame-relay connection and served as Pandesic's back-end host. It was up to Parziale to track down Intel's security controls before he could request contract specifications.

Folded Edge didn't encounter any security problems during its two and a half months with Pandesic, something Parziale attributes to beefed-up security clauses in the contract between Pandesic and Folded Edge. But that contract didn't protect the company when Pandesic went out of business, leaving Folded Edge without an ASP since September.

As Folded Edge searches for another round of funding to get back online, Parziale is looking for an ASP that handles its own hosting, security and Internet connectivity so he doesn't have such a tough time tracking down security policies from multiple vendors.

Additional Measures

Having sat through hundreds of contract negotiations himself, Hryckowian advises potential ASP customers to read the entire contract carefully. In addition, he suggests that you:
1. Prequalify the security backgrounds of those who deploy security at your ASP.
2. Inquire about service-level agreements that suit your business needs.
3. Make sure the contract also includes maintenance windows for regular code upgrades and patches.
4. Balance acceptable risk against security requests.
5. Know the security products and tools the ASP will deploy.
6. Define what action the ASP will take in case of a breach.

Even with the most comprehensive coverage, ASPs make no guarantees. ▶

The Fine Print

What you see isn't always what you get with an application service provider's (ASP) contract. In a recent research note, John Pescatore, an analyst at Stamford, Conn.-based Gartner Group Inc., contends that many ASPs "will rush to market with impressive facades propped up by flimsy, unproven security infrastructures and processes."

Pescatore, a 25-year information technology security veteran, lists 16 questions to ask about every aspect of information security, from background checks on an ASP's employees to two-factor authentication for administrative control on firewalls and routers. He says he feels so strongly about these problem areas that he recommends ditching any ASP that answers no to more than two of the questions.

Clifford Reeser, director of system security at ETrade Group Inc. in Menlo Park, Calif., suggests that several security provisions be added to all ASP contracts. Those clauses should state that:
■ The customer may run periodic and coordinated vulnerability scans against the vendor's Internet connectivity site.

■ The vendor's personnel aren't allowed to have any of the customer's passwords.

■ The vendor is liable if a breach occurs because of poor vendor security.

■ Only a limited number of people can access the data.

■ The data can't be used for anything other than its intended purpose.
– Deborah Radcliff

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TALES OF COMMUTER TERROR

The ride to work is getting scary as hell in several major job markets, as traffic grows by frightening proportions. We talked to some IT professionals whose commutes are guaranteed to drive you insane.
By Erik Sherman

TECH professionals are restless spirits. Always in search of new life in new jobs, they are haunting our highways in growing numbers. They are truly a driven lot.

Unfortunately, many information technology professionals are a bit too driven of late. Many are spending a terrifying amount of time in their cars, on trains and in subways. Like the undead, these commuters are suspended in a state that's not quite that of the living.

This is definitely not what human resources professionals refer to as work/life balance.

And IT professionals searching for new haunting grounds should beware: Some cities and their commutes could positively chill your blood.

According to data from the Texas Transportation Institute (TTI) in College Station and the American Automobile Association (AAA) in Heathrow, Fla., six U.S. cities — Boston, Chicago, Houston, Los Angeles, New York and Washington — offer unusual levels of pain for commuters.

If you work in one of these areas, read on and you'll discover that others share your traffic headaches. And if you don't, feel grateful — at least, until you get back on the road.

Horror Stories

An example of just how bad commuting can get is Cezanne Huq's trip each day into New York. Non-New Yorkers might consider any trip to the Big Apple terrifying. And it's true that the 20-mile drive is tough on even a good day, but Huq says the worst was a two-and-a-half-hour crawl, one way.

"We had a flood," says Huq, director of information systems at Connors

Communications in New York. Major highways were covered in water, reducing movement to a standstill and making drivers wish they had oars. He still shudders thinking about it.

Obviously, this was a freak occurrence. But when you tally all the once-in-a-blue-moon events that haunt IT professionals on their way to and from work, the result is regular mayhem.

"Some truck carrying hazardous material will tip over, and then, of course, the road's got to be closed or rerouted until the cleanup is done," says Marie Handschiegel, an on-site IT staffing manager for Chicago-based Manpower Inc. who works at GE Capital IT Solutions' Bensenville, Ill., office.

"You're not even safe on public transportation. And God forbid it snows or rains," Handschiegel says. "Most of the people out here have lived out here all their lives, but for some strange rea-

son, everyone panics."

And then there are creatures — great and small — to contend with. "There was a case when a truck carrying cattle overturned, leaving the cattle roaming around," says Handschiegel.

But things don't flow smoothly even in between those little disasters. Huq regularly drives an hour and a half from his home in Bronxville, N.Y., to Midtown Manhattan. Only half of that time, though, is spent moving.

"The rest is inner-city traffic that bogs you down," says Huq. "We're talking, like, 20 blocks."

Huq travels the last two miles at 2.7 mph. He could walk that distance in less time.

Regular delays are just that: regular. According to TTI, in very large metropolitan regions like the six listed above (those with populations of 3 million or more), the average driver waits in traffic 54 hours per year.

Smaller cities don't beat the trend, either. In medium metropolitan regions (those with 500,000 to 1 million people) such as Tacoma, Wash., and Omaha, the average annual delay per driver is still 31 hours, says TTI.

Many IT professionals are already selling their souls to their companies, logging 50 to 60 hours per week. The thought of adding another 10 to 15 hours per week sitting in a car is just ghoulish. IT professionals also pay in more ways than simply experiencing aggravations from these delays. On the average, according to TTI, commuters in very large metropolitan regions lose $700 per year in wasted gas and time. Those in medium metropolitan regions get off at a relatively easy $392.

Will this terror ever end? Not on your life. According to recent national figures from TTI, traffic congestion is growing far faster than potential relief. In 1997, the country's largest metropolitan areas were behind in the amount of roadways they needed by an average of 38 miles of freeway lanes and 69 miles of major streets.

Working stiffs want new roads in their backyards like they want graveyards there. And the environmental impact of new construction is heavy, as are the monetary costs. High-tech solutions like light-rail might sound appealing, but they're more expensive than roads, according to The Road Information Program in Washington.

Like a Jekyll and Hyde, though, American drivers are themselves the obvious biggest contributors to congestion. They are willing to drive greater distances, for longer times, and in bigger vehicles.

"In suburban America, which is most of America, the transportation requirements are being met by cars or minivans or SUVs," says Paul Haaland, assistant director of research and communications at The Road Information

Program. "[People are] choosing to live in a certain area with a certain size home and certain amenities."

In metropolitan areas like Washington and New York, that can mean living far outside the city to find affordable housing.

Then there's the way we run our errands.

"In the olden days, we used to make a trip in to take care of some shopping," says David Schrank, a researcher at TTI. We would buy shoes and some clothing, he notes, and make stops at the dry cleaners and the grocery store in one extended trip. Today, we tend to make several smaller trips, he says.

Staggering the flow of traffic could help, but drivers would need to change their habits. "We don't want to do our grocery shopping at 3 a.m.," Schrank notes. But for many IT professionals, the long hours of the average day are turning them into nocturnal creatures.

As if the traffic weren't frightening enough, some commuters seem to be tempting fate.

"You drive down the road and see people reading newspapers, putting lipstick on, drinking coffee," says Gerard Kane, senior vice president of business development at BusinessHere.com LLC in Dayton, Ohio. Kane, who moved to the Midwest from Washington last year, says some terrifying techies even send and receive e-mail in the car in traffic, Kane says.

"You have to concentrate when you're typing, right?" asks an incredulous Kane. He acknowledges that he uses technology on his commute. But he limits himself to doing business by cellular phone while driving. And he has lots of time to kill.

"If you look at the airtime alone, I was spending anywhere from 1,200 to 1,500 minutes a month — up to 2,000 and even more in some months — on the phone," Kane says of his days spent commuting in Washington. "Out here, I'm spending roughly eight hours a month on the phone, as opposed to 25 hours a month. That's a lot of time."

Some IT professionals spend their time trying to keep from winding tighter than a watch spring. Others say the long commute can be the most relaxing time they'll get all day.

"You come up with all these creative things in your car," says Handschiegel. "I had a soothing tape. It was kind of crazy, but I have this John Denver tape that whenever I got stressed about the traffic, I'd put it in and it would comfort me."

Less Time on the Road

Every IT professional develops his own strategy to avoid being driven crazy. Handschiegel set a game plan for her former commute. "When you get to the toll plaza, there is a lane of traffic that merges into [Interstate] 355," she says. "You cut all the way across and start using the entrance lane. When that ends, you go to the shoulder, which is perfectly legal. You take the furthest of the toll plaza lanes when you do this and cut through half the traffic."

How much time did she save? "Probably about five minutes," acknowledges Handschiegel. "But you feel better because you got past five or 10 people. But if you don't time it right, you'll be stuck trying to merge into a solid wall of traffic."

Some IT professionals are unearthing better ways to slash the commute. Betsy Davis, a software engineer, lives on the border between Massachusetts and New Hampshire. Her employer, Conjoin Inc., is in Bedford, Mass., and her trip includes about 20 miles along Route 3, a notorious horror show of a commute.

"It's backed up easily from 6 in the morning up to 9:30 or 10 in the morning," says Davis. "In the evening, the window is probably 3:30 in the afternoon to 6:30 or 7."

On first taking her job, Davis negotiated with Conjoin to have a workstation set up in her home. "I work at home for an hour or so and then come in, missing the traffic in the morning, or the worst of it," she says. ▶

America's Scariest Commutes

For some terrifying traffic, try out these commutes, rated as the most frightening in the country:

Chicago
ROGER McCREDIE

▶▶ BOSTON

Travel rate index	**1.34**
Long-term change	**247%**
Annual delay	**66 hours**
Gallons of wasted fuel	**96**
Annual congestion cost	**$1,095**
Growth in vehicle miles traveled	**2.6%**

AAA Commuter Hot Spot – Interstate 93 north and south, Boston's Central Artery, is an elevated highway through downtown. The road is being rerouted underground, and work isn't scheduled to be completed for a few years. The current road was built in the 1950s to carry 90,000 cars daily, but it now overflows with 190,000 cars. Without the improvements, the six to eight hours of stop-and-go traffic each day had been expected to stretch to 14 to 16 hours by 2010. But even though there will be more lanes once the road is completed, the Central Artery still isn't expected to keep pace with the growing congestion.

▶▶ CHICAGO

Travel rate index	**1.37**
Long-term change	**238%**
Annual delay	**44 hours**
Gallons of wasted fuel	**65**
Annual congestion cost	**$720**
Growth in vehicle miles traveled	**3.3%**

AAA Commuter Hot Spot – Traffic comes to a screaming halt as 34,000 cars heading toward the city from the western suburbs on the East-West Toll-way (Interstate 88) merge with 43,000 cars on the Eisenhower Expressway (Interstate 290). Traffic is funneled into a single lane for one and a half blocks before opening up to multiple lanes. A 20-minute trip to the city often stretches to longer than an hour.

▶▶ HOUSTON

Travel rate index	**1.30**
Long-term change	**57%**
Annual delay	**58 hours**
Gallons of wasted fuel	**90**
Annual congestion cost	**$960**
Growth in vehicle miles traveled	**5.0%**

AAA Commuter Hot Spot – Only one lane exits from U.S. 59 to the Interstate 610 loop, and more than 330,000 cars per day want to use it. Stop-and-go conditions can occur for five to six hours.

▶▶ LOS ANGELES

Travel rate index	**1.51**
Long-term change	**65%**
Annual delay	**82 hours**
Gallons of wasted fuel	**120**
Annual congestion cost	**$1,370**
Growth in vehicle miles traveled	**0.8%**

AAA Commuter Hot Spot – The intersection of Interstate 5, Interstate 10, Route 60 and Route 101 has to carry an estimated 556,000 vehicles per day – far more than its capacity. Motorists making lane changes contribute to a traffic bottleneck that extends for miles.

▶▶ NEW YORK

Travel rate index	**1.30**
Long-term change	**153%**
Annual delay	**38 hours**
Gallons of wasted fuel	**58**
Annual congestion cost	**$640**
Growth in vehicle miles traveled	**3.1%**

AAA Commuter Hot Spot – A 3.8-mile segment of Interstate 278, or the Gowanus Expressway, between the Brooklyn Battery tunnel and the Belt Parkway, is a bottleneck for 175,000 cars per day, with bumper-to-bumper traffic occurring for six hours or more.

▶▶ WASHINGTON

Travel rate index	**1.41**
Long-term change	**153%**
Annual delay	**76 hours**
Gallons of wasted fuel	**116**
Annual congestion cost	**$1,260**
Growth in vehicle miles traveled	**3.9%**

AAA Commuter Hot Spot – Three major roads – Interstates 495, 395 and 95 – converge in the so-called Mixing Bowl. With 400,000 vehicles daily and almost 180 crashes in a two-year period – almost two per week – this is driving misery. A massive highway construction project intended to help relieve the congestion is expected to last eight years.

Scary stats explained . . .

Note: All these figures cover 1997 and are from the 1999 study. (We were waiting for the 2000 study, but the researchers got stuck in traffic while trying to finish it.)

Travel rate index: Indicates how much more time a trip typically takes during peak travel hours because of congestion. The portion to the right of the decimal point represents the percentage of travel time added by congestion. For example, Los Angeles has an index of 1.51, which means a trip requires 51% more time at peak traffic.

Long-term change: Shows how much worse, as a percentage, the annual delay was in 1997 than in 1982. Ah, the good old days.

Annual delay: Indicates the number of hours per year the average driver spends delayed in traffic. Yes, this may equal or exceed the number of vacation days you get. Also realize that these figures are actually understated. When the Texas Transportation Institute computes the statistics, it takes total trips and divides by the total number of adults 18 or over, because it's been impractical to estimate how many people take mass transit. So your time in traffic will likely vary, even if your mileage doesn't.

Gallons of wasted fuel: An estimate of the number of gallons of gas per driver per year burned up while sitting in traffic.

Annual congestion cost: An estimate of how much money in wasted fuel and time the average commuter lost per year in a given metropolitan area.

Growth in vehicle miles traveled: Annual growth in vehicle miles traveled on freeways and main streets between 1992 and 1997.

Sherman is a freelance writer in Marshfield, Mass.

MOREONLINE

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www.computerworld.com/commute

IT consultants who want to leave a lasting legacy should consider launching their own development products. But as David Sims learned, the risks can be as great as the rewards. By Leslie Goff

DAVID SIMS HAD BEEN an independent consultant for about two and a half years when he decided to take a huge step to reshape his practice. His goal wasn't to generate higher revenue streams; rather, he was motivated by the desire to create something lasting.

Sims, president of Sims Computing Inc. in Billings, Mont., created a Java software component. Flux, an automatic job scheduler for Java 2 Enterprise Edition (J2EE), debuted Sept. 5. "If you're doing solo consulting in Java, you'll always have a paycheck," Sims says. "But I wanted to do something new and challenging and see if I could grow from just a one-man consulting business to something more."

Sims could have followed a traditional model of hiring other Java consultants and becoming a larger shop. But he was much more intrigued by the idea of making an imprint with his core competency: programming. Rather than continue to write programs for his clients, he wanted to create software according to his own unfettered vision.

"It was just something I'd always wanted to do. Consulting and working on other companies' projects is fine. But there's something special about having [a product] of your own," Sims says. "You have more control; it's the opportunity to build something that's uniquely your own and build it your own way."

A New Focus

Creating and launching a product brings with it a whole new set of realities, however. Flux has inherently changed the direction of Sims' consulting practice, added an array of new administrative issues and made significant financial demands.

Consulting is taking a backseat to refining, updating and selling Flux. Sims is already at work on Version 2, and he's no longer soliciting long-term consulting contracts. Instead, he's offering short-term training and mentoring services in enterprisewide J2EE application development.

Moreover, Sims is taking a backseat to Flux. Before, he focused on promoting himself and his skills. Now, he concentrates on promoting Flux. He relaunched his Web site (*www.simscomputing.com*) with no reference to his résumé or to himself personally. It's all about the product, its capabilities and licensing fees.

"I think a lot more now in terms of the things a vendor has to be aware of," Sims explains. "In consulting, you try to build up your individual name. Now, I'm trying to build the product's name."
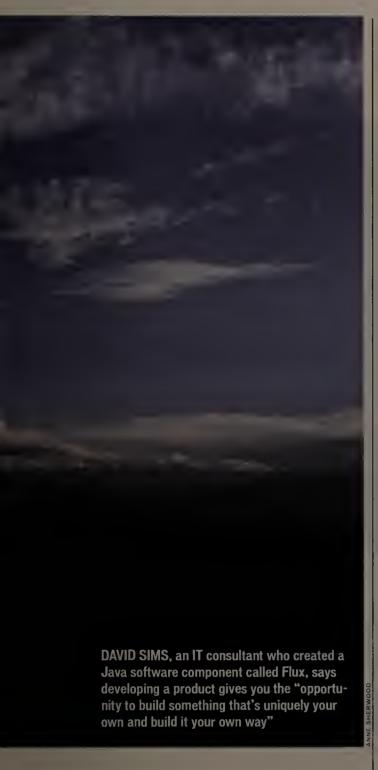
Marketing Overhead

Building the product's name is a job unto itself, requiring both additional work and expense. Sims hired Camille Griep, a sales and marketing director

FROM
Pract
TO
Produ

BUSINESS CONSULTING

with experience in the San Francisco Bay area. Griep had recently returned to her hometown of Billings from Silicon Valley.

While her salary is undoubtedly his biggest marketing-related expense, it's far from being the only one. Next month, Flux will run its first national magazine advertisement, a full-page, color ad in *Java Report*. The professionally redesigned Web site — which replaced a homegrown site — cost "more than I ever thought I'd spend on a Web site," Sims says.

He also needed a new logo and other graphic design work. And next year, Flux will start making the trade show rounds, which will add the expenses of booth rental, product brochures and marketing collateral, in addition to travel expenses.

Personnel

So far, Griep is Sims' only new hire; he already had an office manager. But he'll hire more staff as sales increase. And with additional employees, Sims says, he anticipates additional overhead: He'll have more paperwork and management responsibility as he takes on the tasks of looking after employees' career concerns and job satisfaction.

In the absence of full-time staff, Sims is relying more than ever on professional services to get the job done. As an independent consultant, he already had an accountant and an attorney, but he has more work for them now — especially for the attorney. Both charge him on an hourly basis, but since Sims is in Billings, the fees are more affordable than they'd be in a large metropolitan area, he says.

Sims also contracted with a professional designer for his revamped Web site and logo and with an advertising agency to design the ad in *Java Review*. Next year, he may seek out additional services, such as trade show planning and management and even systems administration for his growing LAN.

"Those things take time away from what I need to be doing to get the product going," Sims explains. "Tweaking my network isn't going to help the product. Coordinating plans for a trade show isn't necessarily something I should be doing. My expertise is the technology."

Legal

Flux has added a range of legal tasks to Sims' to-do list. Especially important are those pertaining to intellectual-property protection, such as copyright and trademark registration and software licensing agreements.

Registering the copyright (which gives the creator exclusive rights to reproduce and distribute the software) was relatively simple, Sims says. Copyright registration forms are available at the U.S. Copyright Office Web site (*http://lcweb.loc.gov/copyright/*).

The completed form, a $30 registration fee and the first and last 25 pages of the source code must be sent to the Copyright Office. If the program is on a CD-ROM, that also must be sent in. While the creator of the software automatically owns the copyright, formally registering it is advantageous in that it establishes a public record and is useful in the event that anyone tries to infringe on the copyright.

Getting a trademark on the product name is considerably more difficult and expensive — a minimum of $325 for each class of goods or services, plus additional service fees for each. Sims says his attorney estimated that the total cost could be as high as $20,000. Since registering a trademark isn't required, Sims has decided to defer it until later.

The language of the licensing agreements also adds to his intellectual-property protection, Sims

notes. One agreement covers a user's right to download and test an evaluation copy of the package. For that agreement, Sims used the industry-standard language that accompanies most evaluation software downloads. The purchase licensing agreement was trickier, he says, because it's as much a sales and marketing tool as it is a legal document.

"You're trying to attract people to your product . . . and if the licensing agreement is hard to comprehend or to apply [in their organizations], they may pause," Sims says. "And anytime there's a pause in their thinking, that may be a lost sale. So you have to make it easy."

Financing

Clearly, all of this takes money. "There's a huge advantage to living in Billings," Sims says, speculating that he might not have been able to launch Flux in a more costly locale. During the product development phase, he supported himself on his earnings from consulting. But to manage all the new expenses requires "a lot more than six months' savings," he says.

Sims wouldn't detail his monthly costs but says that so far, the business has been self-funding. "I'm very leery of getting a loan," he adds. "We have plenty of costs trying to market and support and sell Flux, and the last thing I want is a loan payment."

The Payoff

It's still early in the game, but sales started rolling in the second week after launch, from across the U.S. and as far away as Singapore. Moreover, Sims says, "the company now is actually worth something. A company based on the efforts of a single individual is not worth anything more than the physical assets of the company. Now, we have intellectual property. You can't put that in the bank, but it gives you a certain feeling of satisfaction, and it opens doors."

Sims says he's been approached by major vendors that are interested in using Flux to add functionality to their own products or in partnering with him to sell Flux in conjunction with their products. "I've gotten to talk with other companies that I wouldn't have in the past," he says.

The Long View

Sims says he has two fundamental goals for his business: to write "useful software that people can use to get their job done" and to prove to himself that he "can have a business that does well by providing both human labor and a product."

His personal long-term goal is grander than the mere success of his business, and it reflects the creative spirit that was the impetus for Flux: He says he aims "to write software that will still be running in 10,000 years."

Sims' goal was inspired by the work of the San Francisco-based Long Now Foundation (*www.longnow.org*), which promotes adopting a centuries-long view of society.

"The idea is to bring people together to look further than the next quarter or year or decade," Sims says. "I think that's a neat view — that the reason we're on earth is not to show a quarterly profit; it's something more. And the thing about Java is that it defines a virtual computer: the Java virtual machine. There's no reason why computers in 10,000 years couldn't still be running these [Java virtual machines]." ▶

DAVID SIMS, an IT consultant who created a Java software component called Flux, says developing a product gives you the "opportunity to build something that's uniquely your own and build it your own way"

ANNE SHERWOOD

Goff is a freelance writer in New York. She can be reached at lgoff@ix.netcom.com.

Economic Value Added

BY DAWNE SHAND

REMEMBER Microeconomics 101? Maybe not. At any rate, the class would typically start with the professor striding slowly to the front of the room and announcing that "accounting profits are not economic profits." He would peer over his spectacles to see if any wide-eyed freshman had even a glimmer of the profundity of this statement, then he would sigh. No one gets it at first.
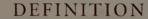
Unfortunately, it's a tenet that often confuses many business and information technology managers as well.

Basic accounting practices define a profit as revenue minus costs. If you spent $10 million on a new plant and earned $10.5 million from the sales of the products it produced, you would claim an accounting profit of $500,000. But that same investment might have generated $11 million or more if it had been invested elsewhere. Suddenly, that $500,000 accounting profit doesn't look so compelling, especially to investors.

According to economic theory, capital eventually moves to the investment opportunities with the best returns because investors want to maximize their profits. An econom-

> ### DEFINITION
> **Economic value added** (EVA) measures a corporation's true economic profit. The objective of EVA is to understand which business units best leverage their assets to generate returns and maximize shareholder value.

ic profit means that a business generates returns similar to an investment in the stock market. Getting decision-makers to think about economic profits as they evaluate new business opportunities is the purpose of using economic value added (EVA).

Michael Contrada, executive vice president at Balanced Scorecard Collaborative Inc. in Lincoln, Mass., explains that "revenue minus costs doesn't tell you much about the cost of resources, such as equity and debt."

EVA says that assets used by a line of business have opportunity costs. Investments in one arena (such as distribution) detract from another (such as manufacturing) that may hold an opportunity for bigger returns.

For example, London-based Diageo PLC, which owns United Distillers & Vintners Ltd., used EVA to gauge which of its

MICHAEL CONTRADA: EVA gives a different view of resources such as equity and debt

liquor brands generated the best returns. The analysis determined that because of the time required for storage and care, aged Scotch didn't generate as much profit as vodka, which could be sold within weeks of being distilled. As a result of the EVA analysis, management at United Distillers began to emphasize vodka production and sales.

A Better Way

The use of EVA has grown steadily as business managers have become increasingly disgruntled with standard accounting practices that often fail to generate information helpful to decision-making. Therefore, more companies have turned to performance measurement tools such as EVA to bolster their understanding of and ability to achieve profitability.

In the mid-1990s, EVA became a popular supplement to the balance sheet. Companies such as Hewlett-Packard Co. began using EVA to show investors just how profitable they really were. *Fortune* mag-

azine even ranks companies by their EVA contributions to show which companies contribute most to overall economic growth.

Consulting firm Stern Stewart & Co. in New York is most often associated with EVA. While it didn't invent microeconomics, the firm has developed proprietary methods and metrics for constructing accurate assessments of EVA.

Al Ehrbar, executive vice president at Stern Stewart, says using EVA can change an organization's capital-allocation process.

This approach works because EVA is "like NPV with a memory," he says, referring to a net present value assessment, which estimates how much money a project will generate over a number of years and then determines how much the potential cash flow is worth today.

Typically, when managers build a business case for a large capital-allocation project using NPV — like the investments and anticipated returns associated with creating an e-commerce channel — they rarely check to see if the earnings projections met their goals, says Ehrbar.

He claims that managers use capital more efficiently when EVA measures are used. "Corporate acts more like a bank," Ehrbar says. So instead of asking for capital as if it were a free resource, managers have an incentive to use assets more wisely, particularly when EVA affects their bonuses.

AL EHRBAR: Using EVA can change a company's capital plan

David Young, an accounting professor at INSEAD, the prestigious business school in Fontainebleau, France, has studied EVA's effects on bonus and compensation systems. Managers on EVA-based incentive plans "are more inclined to buy used assets or refurbish existing assets rather than request capital budgets to buy new assets," he says. "The result is lower capital charges for the company and higher profits."

However, Young says he doesn't believe that an IT department should be measured on EVA standards. That's because EVA is a grand-scale measure; it doesn't break down costs and returns easily.

For example, you wouldn't issue a secondary stock offering or offer bonds to raise money for a new data warehouse. High-level components like gross sales and cost of capital are used to compute EVA.

Although EVA can give employees a sense of their firms' success, it is typically an executive's measurement tool.

When firms understand EVA, it affects how they invest, acquire and sell off assets, says Jon Low, senior research fellow at Cap Gemini Ernst & Young Center for Business Innovation in Cambridge, Mass.
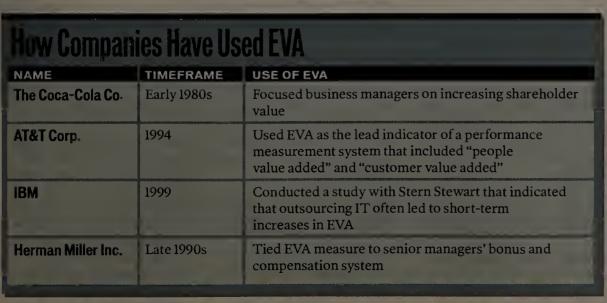
EVA "gives senior executives a powerful lens for comparing subsidiaries" and assessing strategy, notes Low. But it's extremely difficult for the middle layer of an organization to pull the EVA levers, such as sales revenue or margin costs. And that's one of its biggest shortcomings.

"It's an excellent financial measure but may not provide much insight into other business drivers" such as customers or internal processes, adds Contrada. ▶

Shand is a freelance writer in Arlington, Mass.

How Companies Have Used EVA

NAME	TIMEFRAME	USE OF EVA
The Coca-Cola Co.	Early 1980s	Focused business managers on increasing shareholder value
AT&T Corp.	1994	Used EVA as the lead indicator of a performance measurement system that included "people value added" and "customer value added"
IBM	1999	Conducted a study with Stern Stewart that indicated that outsourcing IT often led to short-term increases in EVA
Herman Miller Inc.	Late 1990s	Tied EVA measure to senior managers' bonus and compensation system

■ *Are there business terms you would like to learn about in QuickStudy? Please send your ideas to quickstudy@computerworld.com.*

JOE AUER/DRIVING THE DEAL

Who pays for vendor's development costs?

THE ISSUE OF who pays for a software vendor's development environment usually surfaces in negotiations. Vendors routinely try to include an additional charge for the hardware, operating system software, network connections, tools, utilities and other products and services that are needed to build the software you order. All together, these make up the development environment.

Should you pay for your vendor's development environment? If you're not sure, you're not alone. Many IT procurement managers fail to answer this question correctly. The answer depends on the nature of work the vendor is supposed to do. Failing to understand when you have to pay — and when you don't — can set you up for a fleecing.

Addressing the issue during negotiations, rather than after you've given a vendor the go-ahead to build your software, avoids the potentially costly gotcha, "Oh, by the way, we have to talk about the development environment costs."

The rule of thumb for development environment responsibility is this: If the software you want developed requires a unique environment, you'll probably have to pay for it. And if you do pay for it, make sure you own it. If it's not very unique, don't pay the environment costs. If you're having development done in a standard environment that the vendor already has in place, you shouldn't pay for it. A standard development environment is a vendor's cost of doing business and should be included in its rates.

In some deals, customers can provide actual compo-nents to vendors. If you do, it's important to make sure you own the components or have the right to allow the vendor to use them.

Make sure that any software license you provide allows a third party, such as the software developer, to use it on your behalf. If you lease development equipment, make sure you have the right to relocate it and allow the vendor to use it on your behalf. All of this may seem like trivia, but it could be costly if it's overlooked. Your development agreement should also provide for the timely return of all the development environment components you provided.

If you plan to enter into a longer-term maintenance/support agreement with the development vendor, make sure you obtain the right for a third party to use your components during an extended period of time. Some licenses allow only short-term use. If the third party is a direct competitor of the licensor, it will be more difficult to obtain an extended right of use. If you're not providing the components to the developer — but the developer is acquiring them for the project, and you're paying for them — be sure all your ownership or licensee rights are acquired and assigned to you.

The key to this puzzle is understanding and agreeing up front what's standard and what's unique. The vendor should be responsible for the standard stuff, and you should be responsible for the unique stuff. Regardless, make sure you're getting what you're paying for — or not paying for something you're not getting.

JOE AUER is president of International Computer Negotiations Inc. (*www.dobetterdeals.com*), a Winter Park, Fla.-based consultancy that educates users on high-tech procurement. ICN sponsors CAUCUS: The Association of High Tech Acquisition Professionals. Contact him at *joea@dobetterdeals.com.*
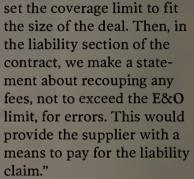
Mail Bag

In my Sept. 4 column, I ran an e-mailed question from Mike, a vice president of a regional bank who asked for input on a few vendor liability and accountability issues.

Here's a good suggestion from Greg Hopkins, who's with the procurement department at All-state Insurance Co.: "What I've been able to do is to require the supplier to purchase errors and omissions [E&O] insurance [professional malpractice insurance that covers damages caused by the insured's failure to perform as represented]. We try to set the coverage limit to fit the size of the deal. Then, in the liability section of the contract, we make a statement about recouping any fees, not to exceed the E&O limit, for errors. This would provide the supplier with a means to pay for the liability claim."

Thanks, Greg and Mike! Watch for more reader suggestions. ▶

BRIEFS

Amazon Builds Net

Seattle-based retailer Amazon.com Inc. has selected Burlington, Mass.-based eXcelon Corp.'s B2B Integration Server and B2B Portal Server to create a new partner trading network. It also chose eXcelon's ObjectStore object database software to boost its Web site performance.

Outsourcing Woes

A survey of 50 business and information technology workers, conducted by Cutter Consortium in Arlington, Mass., found that poor project management has plagued many outsourced Web projects.

Seventy-nine percent of respondents said electronic projects experienced schedule delays, and 63% said they exceeded budgets. Other problem areas included inadequate functionality (53%) and poor-quality deliverables (52%).

IT Budgets Increase

IT budgets among U.S.-based companies in the manufacturing and services industries will increase by approximately 5% next year, according to a recent survey by AMR Research Inc. in Boston. The survey of 900 IT and application development specialists from 13 industries revealed that spending on e-commerce applications is expected to increase from 19% of budget totals this year to 23% in 2002. Enterprise resource planning application spending is expected to decrease

42% to 37% of the overall budget during the same period.

Amex Cuts Middlemen

American Express Co. merchants can now connect directly to the New York-based credit-card company, bypassing third parties and cutting time and fees. The new system, VeriSign Inc.'s Payflow, is available immediately for small and medium-size merchants, Mountain View, Calif.-based VeriSign announced last week.

Online Bank Launched

Despite resistance to online-only banking by some financial institutions, a group of former First USA Bank NA executives launched a new Web-based bank last week. Wilm-

ington, Del.-based Juniper Financial Corp.'s Juniper Bank offers credit cards, wireless banking and online bill payment.

ShipLogix Names VP

ShipLogix Inc., a Hudson, Ohio-based transportation management system that allows shippers, carriers and business-to-business marketplaces to collaborate online, has named Randy Boettcher vice president of strategic alliances for e-commerce.

IBM Buys OpenOrders

IBM last week announced the acquisition of Newton, Mass.-based OpenOrders Inc., which makes order management and fulfillment software for e-business. IBM said it

expects the acquisition to strengthen its WebSphere Commerce suite. IBM said it will incorporate the software, which enables integrated order management and customer support through multiple channels, into its WebSphere software suite.

Engineering a Market Merger

Bidcom Inc. in San Francisco and Cephren Inc. in Palo Alto, Calif., both Internet marketplaces serving the $3.9 trillion engineering and building industry, have announced that they will merge. The combined company, to be named Citadon Inc., will be based in San Francisco. It will have more than 30,000 subscribers and a global portfolio of 1,200 projects worth more than $110 billion.

When your application hits the Oracle performance wall, how will you scale it?

If you run web applications on a relational database, sooner or later you will run into a wall of speed and scalability limitations.

What are the first signs that the wall is getting close? Maybe your data center starts buying more expensive computers. Or maybe you are suddenly spending money on "middleware".

Before you know it, the costs related to running your relational database are skyrocketing, while your probability of success is plummeting – because relational database technology was never meant to meet the performance demands of today's e-applications.

The best way to scale the performance wall is with Caché, the post-relational database proven to run SQL based applications up to 20 times faster than relational database technology, and to scale up to many tens of thousands of users without sacrificing performance.

Plus, Caché includes a rapid e-development environment, with simple-to-use yet powerful object technology that dramatically accelerates the creation and adaptation of sophisticated web applications.

Caché comes from InterSystems, a specialist in high-performance database systems for over twenty years – with 24x365 support, and over 3 million users worldwide. *Caché is available for Windows, OpenVMS, Linux and major Unix systems.*

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TECHNOLOGY

NET-BASED DEMOCRACY

The first online voting trial in a presidential election will take place next month, when voters in Arizona's Maricopa County cast sample ballots via the Internet. The Arizona vote and two similar pilot projects in California signal the growing acceptance of online voting, already embraced by labor unions, political parties and technical organizations. ▸ **70**

NOW BOARDING: WIRELESS

Sabre Holdings says it's preparing to release wireless technology that will let airline passengers use Web-enabled cell phones and other handheld devices to check in and board their flights. The system will use voice biometrics and screen shots of bar codes to identify passengers and then send images of boarding passes to their mobile devices. ▸ **72**

SECURITY JOURNAL

As a vendor's training program for a good scanning tool dissolves into marketing hype, our security manager and his team walk out feeling cheated. The moral: Next time, save the airfare and bring in a consultant for in-house training. ▸ **76**

FUTURE WATCH

As the limits of electronic computers are approached, optical computing promises smaller, faster and cheaper computers. Optical digital computers will be in space, controlling the operation of satellites, say NASA scientists. Observers say earthbound applications for the new technology are still emerging. ▸ **78**

HAVE STORAGE, WILL TRAVEL

Today's removable storage devices are a lot more capacious than floppy disks ever dreamed of being — holding as much as 30GB or more. Here's a look at several of the newer alternatives that prove that when it comes to data, you *can* take it with you. ▸ **84**

QUICKSTUDY

Storage resource management, a subset of storage management, consists of a class of tools that monitor, alert and report on the health, configuration, availability, performance and usage of specific or distributed networked storage resources. ▸ **88**

EMERGING COMPANIES

Epicentric is turning heads with its portal software, which lets users quickly create and manage a network of Web-based information portals that present unique faces to different constituencies. It's a nice touch, but can the San Francisco-based start-up survive against larger competitors? ▸ **90**

LESLIE TOWNSEND'S company, Wireless Dimensions, is using a native XML database to support a system that will let sports fans use wireless devices to order nachos and other items from their seats at the ballpark

PHIL HOLLENBECK

XML FINDING NATIVE GROUND

EXTENSIBLE MARKUP LANGUAGE (XML) is emerging as the format of choice for a variety of types of data, especially documents. With its ability to tag different fields, XML makes searching simpler and more dynamic, turning enterprise documents from recycling fodder into data-mining gold. But how well does it function as a native database format? And how does it work out in practice?

80

Online Voting Moves Closer to Acceptance

Arizona, California election trials are latest steps toward legitimacy of system

BY ANN HARRISON

THE FIRST online voting trial in a presidential election will take place Nov. 7, when voters in Arizona's Maricopa County will cast sample ballots on the Internet. The Arizona vote and two similar pilot projects in California signal the growing acceptance of online voting, already embraced by labor unions, political parties and technical organizations.

In August, delegates at the Democratic National Convention in Los Angeles cast their votes from the convention floor using Web-based technology. More than 34,000 members of The Internet Corporation for Assigned Names and Numbers (ICANN) followed the trend this month when they cast ballots online to choose five board members.

California Secretary of State Bill Jones is preparing to oversee a nonbinding shadow election in Sacramento and San Diego counties, where voters will cast online ballots for the presidential election. Election officials in Arizona and California say online voting could improve voter access and provide faster election results at a lower cost. Binding online elections for state and municipal offices will likely be held in several states next year.

"Using the Internet for voting is just one way government will provide accurate and timely results to the public," said Arizona Secretary of State Betsey Bayless. "It is inevitable that it will become the way of the future. Now is the perfect time to test the viability of Internet voting."

There are two forms of Internet voting: poll-site and remote. Companies developing online voting systems generally support gradual adoption of Internet voting for public-sector elections, starting at conventional polling places and

evolving over time to voting from homes and offices. The widespread adoption of online voting will ultimately depend on state certification and voter demand. But successful online election systems must address the sometimes conflicting requirements of privacy, security and verifiability.

> **It is inevitable that [online voting] will become the way of the future. Now is the perfect time to test the viability of Internet voting.**
>
> **BETSEY BAYLESS, ARIZONA SECRETARY OF STATE**

There are several Internet voting systems currently used to run elections. Marina del Rey, Calif.-based ICANN chose the system from Garden City, N.Y.-based Election.com Inc. for its election, which was conducted in eight languages on six continents.

According to Mark Prieto, CIO at Election.com, online voting was uniquely suited to handle the complexity of the ICANN election, which selected board members from five

global regions. "In a global election with paper ballots, it could have taken more than two weeks just to tally the results according to the preferential voting system, not to mention additional weeks to mail out ballots to registered voters around the world," Prieto said.

During the first 12 hours of the 10-day voting period, 2,800 of the more than 76,000 ICANN members encountered an error message when they attempted to submit their votes. The problem was caused by the interaction of Election.com's voting system with ICANN's encryption routine.

ICANN issued encrypted personal identification numbers (PIN) to its members via postal mail and provided the encrypted list to Election.com. But the Election.com voting application couldn't obtain a valid response from ICANN's encryption routine and didn't accept the votes. Affected ICANN members were notified immediately via e-mail and were directed to log on and cast their votes. Of the 2,800 people who received an error on their first attempt, 2,685 returned to the site and were able to successfully cast votes.

A 'Yea' Vote Cast

In addition to interoperability problems, Election.com was criticized for sending PINs to voters in a controversial Arizona Democratic primary last spring, the first legally binding political election that used online voting in the U.S. Critics were concerned that the numbers could be intercepted and used to cast fraudulent ballots.

But during the roll call vote at this year's Democratic convention, state delegations used PINs to cast nomination ballots at computer terminals on the convention floor. Election.com tabulated the roll-call votes and presented them electronically to convention managers. The results were simultaneously posted on convention center monitors and a Web site.

"Until this year, we had nev-

er been able to monitor the delegations or reference vote results in real time," said Democratic National Committee Secretary Kathy Vick. "Election.com put that information at our fingertips, exceeding our expectations and changing the face of convention balloting as we know it."

How Online Voting Works

Bellevue, Wash.-based VoteHere Inc. (*www.votehere.net*), which will supply the computer equipment and technology for the Arizona and California pilot projects, has already run online voting trials in 10 states. But the Arizona and California trials are unique because the states have formed technical review committees to evaluate the technology and user feedback.

"You have to be really careful," said Jim Adler, president and CEO of VoteHere. "This is voting, after all, and we don't want to be responsible for unraveling the free world here. We want to take some extra steps."

VoteHere has developed online voting systems for public and private elections, market research and surveys; it even developed a system used by striking Boeing workers. According to Adler, the company can compete with the $3 to $20 the counties involved in the pilots now pay to record each vote. He said he expects VoteHere to be certified to conduct online voting in grocery stores and shopping centers in 40 states next year.

VoteHere addresses security and privacy concerns with powerful encryption and advanced security protocols. To ensure secrecy, every ballot is encrypted with a public key and signed with a digital signature. The entire vote count is encrypted, eliminating the need to handle decryption keys for individual votes.

The VoteHere software runs on Internet-connected Compaq Computer Corp. iPaq computers installed at polling sites. VoteHere's secure data centers deliver ballots to voters and

collect and tabulate votes. Once ballots reside on a network, they can be mirrored on other sites to prevent the elimination of ballots or secret tallies. Unlike traditional voting machines, the VoteHere system makes an encrypted impression of each ballot that can be used in an audit of the ballot count. "In public-sector elections, political parties will contest elections, and we need to be ready for that," said Adler.

VoteHere representatives "have been open to discussing their technology and how it is able to ensure that security and ballot privacy are intact," said California's Jones. "This is vital to making election officials and voters comfortable with online election systems." ▶

Threats and Defenses

Security threats such as denial-of-service attacks could shut down online voting, VoteHere President and CEO Jim Adler acknowledges. Adler said the solution is to allow voters to cast ballots for as long as one month and then close online polls before election day to eliminate a window of vulnerability. Redundant systems, wide-area fail-over and multiple data centers can also provide technical safeguards.

If computer hackers attack data centers, VoteHere uses the distributed trust model to ensure that no votes can be added, deleted or changed. Each election official has keys to the encrypted votes, and each voter gets a receipt for his ballot. Ballot records are burned into an indelible medium, so the original count is recorded if attackers access the database.

Online voting protocols also require a high level of visibility similar to those in traditional balloting, where officials are present at the polls to guard against fraud. The VoteHere election protocol has been reviewed by a number of respected cryptographers, and the company plans to publish its verification code to allow online observers to continue to evaluate and verify results.

"You have to get this stuff out there; you can't beat your chest and say, 'Trust us; we know how to do an election,'" said Adler. "That is a recipe for disaster." – *Ann Harrison*

Sabre Launches Wireless Flight Check-in

BY MICHAEL MEEHAN

Within the next six months, Sabre Holdings Corp. plans to roll out a wireless check-in and boarding system that it says will allow travelers to use nothing more than their Web-enabled phones or personal digital assistants (PDA) to make their way to airplanes.

The Fort Worth, Texas-based travel-technology giant last week announced that it's teaming with Dallas-based wireless vendor Impulsity Inc. to develop the new system. The system will use voice biometrics and screen shots of bar codes to identify airline passengers and then send images of boarding passes to their mobile devices.

The check-in system will work on mobile phones that support the Wireless Application Protocol (WAP) and on PDAs such as the Palm VII, said Chris Serafin, Sabre's vice president of applications development.

Sabre is negotiating with various airlines over deals to implement the technology, Serafin said. The company designed the passenger-processing systems used by airlines including American Airlines Inc. and US Airways Group Inc.

At first, the wireless check-in system will only be offered to existing Sabre customers. Serafin said the company will make the technology universally available next year.

No Significant Changes
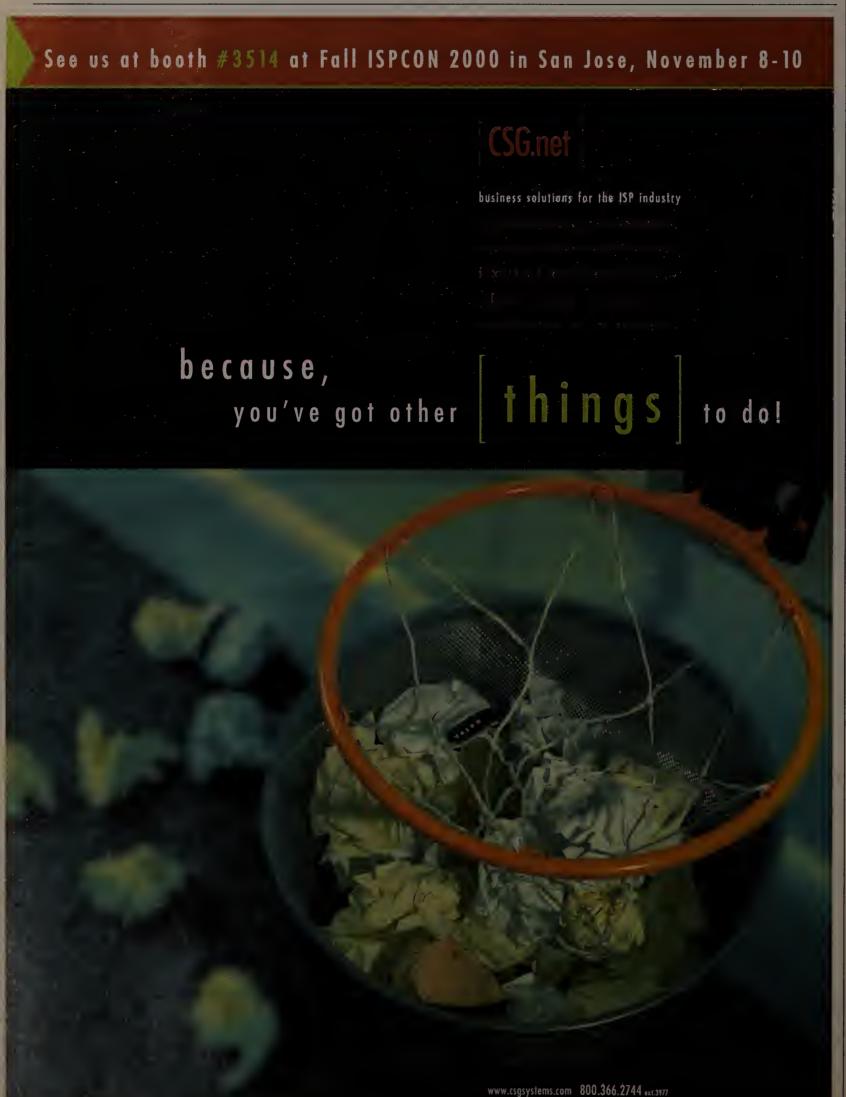
Kevin Weber, an information technology manager at American Trans Air Inc. in Indianapolis, said he hopes to adopt the wireless check-in system soon after it becomes available. The new system should be especially good for business travelers who often rush to catch flights, he added.
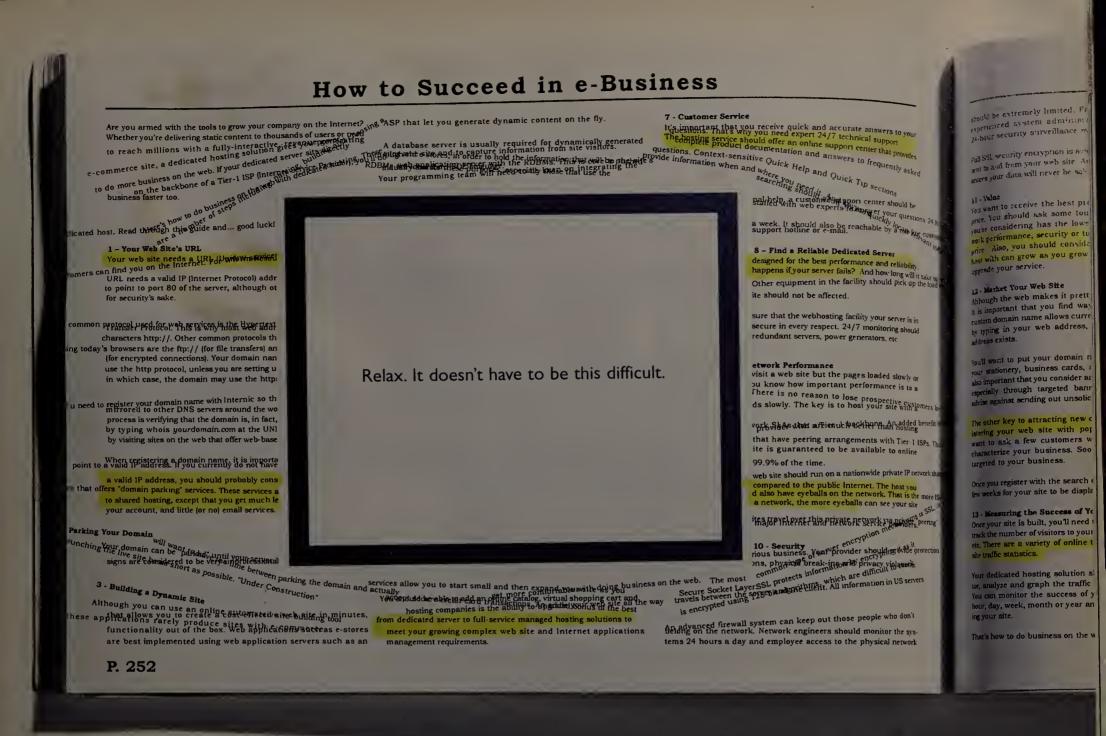
As for implementing the wireless technology, Weber said he doesn't expect to have to make any significant changes to the internal systems at American Trans Air.

Krista Pappas, a travel industry analyst at Gomez Advisors Inc. in Lincoln, Mass., said a key to making the system workable for travelers is to not require complex codes or tedious button pushing. "They have to be careful that all this innovation doesn't confuse the passenger," she said.

Sabre said the wireless check-in system was built so travelers wouldn't have to memorize long registration codes or personal identification numbers. Instead, passengers register their voices with individual airlines via Impulsity-developed technology.

After establishing a voice-print for a passenger, Sabre said, an airline's check-in system can then contact his WAP phone or PDA prior to a scheduled flight, verify the voiceprint and then supply a screen shot of a bar-coded boarding pass. The passenger would only need to wave the image in front of a scanner at the assigned airport gate before boarding the plane. ▶

TECHNOLOGY

Clinton Pushes for Frequencies to Support Wideband

BY BOB BREWIN

President Clinton has mobilized a number of federal agencies to jump-start their assignment of the radio frequency spectrum that will be needed to support advanced wideband wireless services.

Clinton has directed the U.S. Department of Commerce and the Federal Communications Commission to develop a plan to select so-called third-generation (3G) wireless frequencies. He asked the two agencies to submit an interim report by Nov. 15 on current spectrum use and the potential for moving users away from the frequency bands.

Clinton said he wants to see 3G broadband wireless licenses auctioned by the FCC no later than Sept. 30, 2002.

The mobile wireless industry hailed Clinton's move. 3G spectrum "is a prerequisite for innovation to continue" in the wireless industry, said Tom Wheeler, president of the Cellular Telecommunications Industry Association, a Washington-based association of wireless carriers and suppliers.

But fixed wireless carriers, educators and the U.S. Department of Defense, all of which currently occupy frequencies targeted for potential mobile use, emphasized the economic, educational and national security importance to their uses of the frequencies.

Currently, the U.S. has 189 MHz of bandwidth allocated to mobile services. The country needs another 160 MHz to support new broadband wireless services, said Greg Rhode, assistant secretary of commerce for communications and information.

Making the situation more difficult, a key block of frequencies identified for potential 3G use is already being used extensively by World-Com Inc. in Jackson, Miss., and Sprint Corp. in Kansas City, Mo., to provide fixed wireless services.

"I don't want to move" off the existing Instructional Television Fixed Services frequencies, said Dennis Haarsager, associate vice president and general manager for educational technology at Washington State University in Pullman, Wash. ▶

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Security Team Goes to School of Hard Knocks

Jude learns the hard way how disappointing vendor training programs can be

LAST WEEK, I complained about how dull the courses I was attending were. This week, my frustration got the better of me and my staff walked out — and one-third of the people in the course followed me.

I've been training on some products supplied by Atlanta-based Internet Security Systems Inc. (ISS). Last week, I discussed Internet Scanner (very good) and System Scanner (good product, poor interface), both of which scan systems to find security holes. This week, our training was on RealSecure, intrusion-detection software from ISS.

RealSecure is an interesting product for any security manager. In the same way that virus scanners scan all passing data to look for predefined virus signatures, RealSecure's agents scan all passing network data or all activity on their server to search for predefined attack signatures.

In effect, RealSecure acts as a burglar alarm for your systems — and it's one of the most flexible and adaptable burglar alarms you'll ever see.

Interface Problems

Although the product itself seems to be very good, the interface sucks. Just as with System Scanner, I encountered a host of little problems that don't cause too much trouble individually but combine to render the product quite difficult for me to use.

These problems are relatively minor if you just run a small installation of RealSecure. For example, RealSecure installs agents on each server or network segment that you wish to monitor and then sends all the alerts to a central console. To get an agent to report to a console, all you need to do is click the mouse four times and wait a couple of seconds.

That's a trivial operation if you're looking at four agents, but 400 is a com-

Security Manager's Journal

pletely different story. Just to cap that off, every time I shut the console down and reopen it, the agents disappear. Time to start again: click, click, click, click, wait ... one. Click, click, click, click, wait ... two.

In fact, of the two large RealSecure installations I've seen, neither one uses the RealSecure console. Luckily, ISS provides a command-line facility so you can bypass much of these design flaws. This should make the product quite usable.

Incidentally, the manager of one of these large installations describes ISS as very responsive to criticism. He says ISS has met every commitment it's made to him, which sounds like no vendor I know.

So why did I walk out of the training course? Two reasons: First, it was on Version 3.2.1 of the product; we use Version 5.0. The first time we heard of the difference was on Day 1 of the course. That's not exactly managing expectations.

But we could have put up with that if the course had more to do with the product. Instead, it started with the usual marketing spiel. Why bother when we've already bought the products? Then the trainer launched into a basic tutorial on security — policies, passwords and so on. It was all stuff you really ought to know if you're going to be doing security work, but it had little place in a product-specific training course. All of my staff at the course already knew this material — in some cases, much better than the trainer.

Again, I could have put up with that, but my frustration boiled over when the trainer admitted that there were about two hours of product-related content in the two-day course.

We had five staff members at the training course, two of whom had taken trans-Atlantic flights to get there. Add the opportunity costs of lost work and the training costs per person for the

two days, and suddenly those two hours become some of the most expensive bits of tuition I've ever seen. This is a textbook example of how to sour a customer relationship in one easy lesson.

Overall, my impression of ISS is that the company is run by highly focused, highly technical people who design products for people like themselves, perhaps without enough thought to training. That's great if that describes you, but a better description of me is that of a busy manager who wants a simple life. I have a feeling this product is going to cause me headaches.

And a word of warning for anyone hiring staff to work on ISS products: If your prospective employees start boasting about ISS "certifications," I wouldn't take too much notice.

The System Scanner and Internet Scanner certification tests are open-book, 25-question multiple-choice exams, with the trainer on hand to answer any questions that you can't. Those people who did manage to get a question wrong had their papers handed back for another go. Not exactly a rigorous test.

Rolling Into the DMZ

Training disappointment aside, now it's time to plan the rollout on our systems. We're going to be using Internet Scanner to look at all our networks from publicly accessible points, such as the Internet gateway and Remote Access Server, so that we can see the same security vulnerabilities as any attacker might see.

We'll then install System Scanner agents on all high- and medium-risk servers, such as primary domain controllers, servers in our DMZ, Web servers and so on, plus one more agent on a representative standard-build Windows NT server and one agent on a standard-build Unix server. That way, we'll have all our important machines explicitly covered and a fair idea of what's happening on our file and application servers.

Finally, we'll install RealSecure on all network segments, plus one agent on the inside of the firewall and another on the outside. We can then double-check what our firewalls are stopping and what they're letting through.

Because of the limitations of the System Scanner and RealSecure consoles, we'll put each on a separate NT server

in our machine room and access them remotely, so we can leave them in as steady a state as possible.

We also have to classify our servers by risk, so we know exactly which ones to monitor, and work out where on the network we need to put the RealSecure network consoles.

Although Internet Scanner can be used through a firewall, it will probably give better results if we attach it directly to the network segments we want to scan. Otherwise, if we scan a network segment through a firewall and the scan shows that a particular vulnerability isn't present on that network, we don't know whether that's because we've already secured the network segment or because the firewall's blocking the scan attempt.

So for portability, we'll put it on a laptop and physically take it around to our target networks. I must remember to make sure that every scrap of data on that laptop is encrypted at all times — I don't care to think of the fuss if we lost that laptop.

That makes three purchase requisitions, one piece of network topology and a minor risk assessment to do. Who knows, in a few months, I might be ready to start up the software itself. ▶

As the limitations of miniaturization appear to have been reached for today's electronic computers, researchers are trying to push beyond them by substituting light for electrical voltages in computer components.

"What we are accomplishing in the lab today will result in the development of superfast, superminiaturized, superlightweight and lower-cost optical computing and optical communication devices and systems," says Donald Frazier, a senior scientist for physical chemistry at NASA's George C. Marshall Space Flight Center in Huntsville, Ala., where scientists are working on solving a variety of problems that must be overcome before digital optical computing can be realized.

But will these superfast, supersmall digital optical computers have general applications? Or is that the wrong question to ask?

Just as an earlier era saw superhighways built with more capacity than anyone imagined would be needed — and where traffic now idles for miles in smoggy jam-ups — once digital optical computers are built, applications will follow.

Switching Speed

Using light instead of electrical voltages to perform computations and communications, digital optical computers are said to promise switching speeds and parallelism that will swamp the capacity of today's massively parallel computers and could eventually put that kind of computational power on desktops, if not in handheld devices.

They'll be in satellites managing the ever-expanding demands of communications, and they'll be aboard long-term space flights, says physicist Hossin Abdeldayem, also at NASA's Marshall Space Flight Center. The need for the power of optical computing is already being met through programs that do complex modeling, such as those used for weather prediction, he says.

Computations that would take 11 years with conventional electronic computers will take only one hour with optical computers, Abdeldayem adds.

The need for this kind of speed already exists, he says,

DONALD FRAZIER at NASA's Marshall Space Flight Center is working to develop "superfast, superminiaturized, superlightweight and lower-cost" optical technologies

The Speed Of Light

As the limits of electronic computers are approached, optical computing promises smaller, faster and cheaper systems. By Jan Matlis

though it will take another 10 years before computers using all-optical digital technology are on the market. Abdeldayem says he's worried that Japan and Europe are investing more heavily than the U.S. in the research that needs to be done.

The first stage in the movement toward an all-optical world will probably be hybrid electro-optical computers. On-chip miniature lasers and detectors controlled by electronics can already be manufactured. The optics will handle the communications, with light traveling along fibers or films; the advantage over electrical communications is that light waves don't generate crosstalk or require insulation. Fre-

quencies can be multiplexed to easily achieve parallelism.

In the world of massively parallel computers, designers are working on free-space backplanes in which optical signals make the connections. Unlike electrical signals, light signals can cross paths without affecting the information that's received at their destinations, and information can also be multiplexed, with possibly as many as 1,000 separate channels in a single pulse.

In communications, optical switching devices have already passed the proof-of-concept phase. It's no longer necessary to translate between optical and electrical signals at every switch. For the burgeon-

ing Internet, this optical processing means terabit speeds are possible.

But the components that are crucial for all-optical digital computers are still in the design phase. Logic gates and bistable devices (or flip-flops), which work without the intervention of electronics, haven't been perfected yet.

Achieving the nonlinear behavior needed for all-optical logic gates and bistable devices still requires a great deal of energy. The amount of power required in the laser pulses needed for optical computing, while feasible in the laboratory, isn't a possibility for a miniaturized computer.

Scientists trying to solve

these problems are concentrating on organic materials, some of which exhibit strong binary — rather than linear — transitions and fast switching speeds. The switching speeds are important because a computer can operate no faster than the switching speed of its underlying substrates.

Groups at Brown University and IBM's Almaden Research Center have reported achieving 100 picosecond rates. At the Marshall Space Flight Center, Abdeldayem is using organic films only one micron thick, driven by laser pulses, to run at pico- and femtosecond rates.

Key Logic Gates

Abdeldayem has designed an "and" gate, one of the basic logic gates used by computers, and he reports being close to producing a "nand" gate, which would be even more significant. All of the Boolean logic used by computers can be created out of nand gates.

Another issue also remains: Which aspect of light would be the best solution for creating the ones and zeros that are the lifeblood of computer logic? Abdeldayem's organic switches provide an "on" or "off" transmission state. But so far, researchers haven't identified a particular organic material that works best.

Some scientists have suggested that it might be better to use the direction of the polarization of light for ones and zeros, with polarization in one direction meaning "one" and polarization in the other direction meaning "zero." They argue that then both states would involve a flow of energy, so the result of one operation could easily cascade down to the next logic gate in a sequence.

Long-term memory is also an active field of research. Scientists are looking at storing data in holograms or crystals.

Big applications that are already pushing the limits of today's capacity will probably be the first to benefit when all-optical digital computing is finally realized. What else will follow when optical computing matures as a technology is anyone's guess. Who could have predicted 50-mile-long traffic jams and the Web? ▶

Matlis is a freelance writer in Newton, Mass.

XMLENTERS THE DBMS ARENA

Everyone agrees XML is a great way to exchange data among applications and organizations. But how well does it function as a native database format? And how does it work out in practice?
By Edmund X. DeJesus

EXTENSIBLE MARKUP Language (XML) is emerging as the format of choice for a variety of types of data, especially documents. With its ability to tag different fields, XML makes searching simpler and more dynamic, turning enterprise documents from recycling fodder into data mining gold. Because XML content is liberated from presentation format — which independent style sheets specify — XML enables the extensive reuse of material. This allows enterprises to turn the same content into press re-

leases, white papers, brochures, presentations and Web pages. For enterprises trying to meld incompatible systems, XML can serve as a common transport technology for moving data around in a system-neutral format. In addition, XML can handle all kinds of data, including text, images and sound — and is user-extensible to handle anything special.

Clearly, XML is coming into its own and seems destined to become the lingua franca of data online and off-line.

The problem until now has been how to manage the XML-tagged data. One promising solution is to use data-

bases to store, retrieve and manipulate XML. The idea is to place the XML-tagged data in a framework where searching, analysis, updating and output can proceed in a more manageable, systematic and well-understood environment. Databases have the merit that users are familiar with them and their behavior, so taming XML with a database context seems natural.

However, there are XML databases and there are XML databases. Purists would contend that only databases that store XML in its native format deserve the label "XML database." Others contend that if you can store and retrieve

TECHNOLOGY

XML from it, and it's a database, then it's an XML database, regardless of how the data is stored. We'll sidestep these religious battles and consider both types. If the XML isn't stored internally as XML, we'll call that an "XML-enabled database." If the XML is actually stored as XML internally, we'll call it a "native XML database."
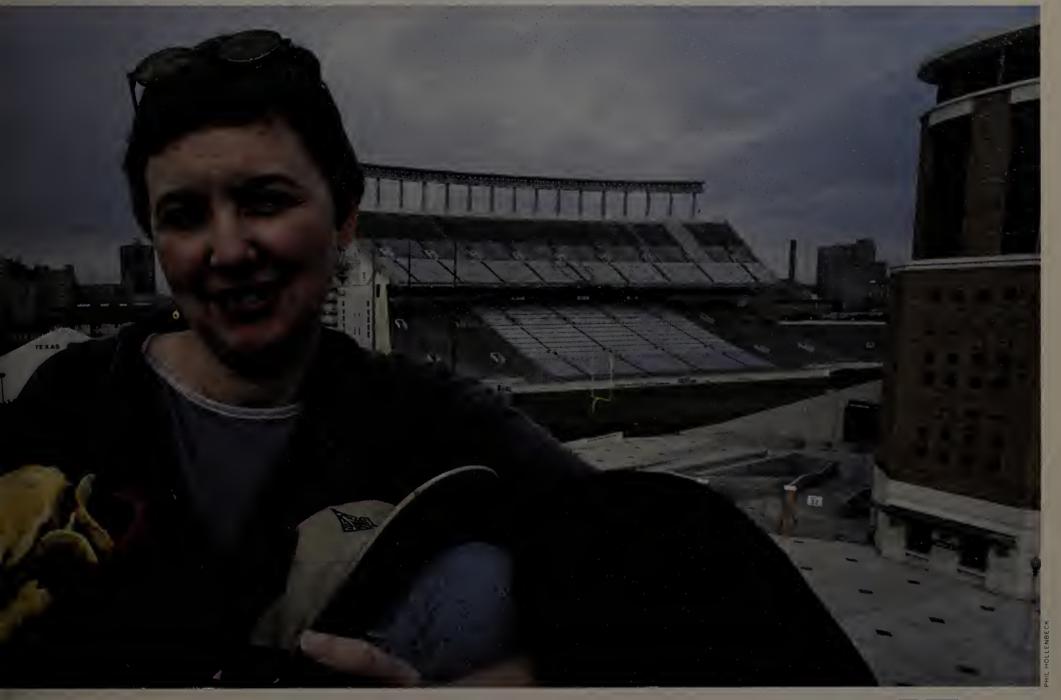
There are a number of reasons to use existing database types, and existing database products, to store XML even if it isn't in its native form. First, ordinary relational and object-oriented

Luckily, you don't have to. There are XML-enabled databases that handle XML fine and that are based on tried-and-true relational or object-oriented models. These databases typically accept XML, parse it into chunks that fit the database schema and store it as usual. To retrieve XML, the chunks are pieced back together again.

Content@XML from Xyvision Enterprise Solutions Inc. in Reading, Mass., is a content management system that stores XML documents in any of the popular relational databases.

ported as they'd prefer," says Parsons. "Using a relational database allows them to leverage existing database expertise."

One user of Content@XML is Element K Content LLC, a technical publisher in Rochester, N.Y. "Using XML, we can create content regardless of presentation, reuse that content and customize the output as necessary," says Kress Riley, vice president of content development at Element K. The system receives material in XML and delivers it in whatever format is appro-

PHIL HOLLENBECK

databases are well known, while native XML databases are new. Second, as a result of familiarity with relational and object-oriented databases, users understand their behavior, especially with regard to performance. There is a reluctance to move to a native XML database whose characteristics — especially scalability — haven't been tested. Finally, relational and object-oriented databases are safe choices in the corporate mind. It's the old "nobody ever got fired for buying X" rationale. You don't necessarily want to bet the enterprise on a native XML database when you don't have to.

"Content@XML enables collaborative work on the content itself, while allowing multichannel delivery of output," explains Jonathan Parsons, director of product marketing at Xyvision. Content@XML originated with clients who were working with Standard Generalized Markup Language, so the transition to XML was a natural one. The XML format is helpful since it's a World Wide Web Consortium standard and keeps the structural information independent of format presentation, lending itself to easier reuse.

"Clients feel that native XML databases aren't as well known or well sup-

priate. "XML cuts a two-week process down to a few minutes," Riley reports.

Lotus Development Corp.'s Domino database can also handle XML. Lotus' XML Toolkit even allows you to create and process content as native XML.

When using XML with a relational database, third-party middleware can be useful to handle the translation. One such product is XML-DBMS, a tool based on Java Database Connectivity (JDBC) that transfers data between XML documents and the database. "XML-DBMS allows you to rapidly use XML to populate a database that may already be part of exist-

> **XML'S HIERARCHICAL FEATURES ARE HELPFUL FOR SEVERAL ASPECTS OF [OUR SOFTWARE PRODUCT].**
>
> LESLIE TOWNSEND (ABOVE),
> VICE PRESIDENT, WIRELESS DIMENSIONS

ing applications," says Ronald Bourret, creator of XML-DBMS. Naturally, it works in reverse also, turning database output into XML. This can be useful both for publishing the resulting XML using style sheets and for transporting the data as XML. "XML-DBMS components plug the void in the middle between the database and the structure of an XML document," says Asante Bremang, a researcher at the University of Liverpool in England.

There are several criticisms of the use of relational and object-oriented databases to store XML. For example, one of XML's attractive features is its hierarchical organization, which database tables crush. Relational databases must map XML to relational tables and therefore flatten XML structures into rows and columns each time data is needed. Uche Ogbuji, principal consultant at Fourthought Inc. in Boulder, Colo., says XML is a mismatch with relational databases. "You can do tricky joins associating XML type to a database row to make them work, but they're hard to maintain," he says.

In addition, translating XML to and from the database requires considerable processing, especially for large or complex documents. This performance factor may be most bothersome when dealing with one of XML's fortes: producing Web pages from format-independent content. The problem is that the resulting pages may not load fast enough. Usually a client requires that a certain relational database be used, regardless of its suitability to the task. In such cases, Ogbuji says he prefers placing a wrapper around the relational database to handle the XML translation. But there's a lot of overhead in such an approach.

Native Land

XML purists would argue that the way around these difficulties is to store XML natively, which makes sense. This immediately eliminates the need for translation between XML and the database. A new breed of such native XML databases is now emerging.

The first and probably best-known commercial native XML database is Tamino from Software AG in San Ramon, Calif. Besides being able to store and access XML, Tamino has all the fixings, like Open Database Connectivity, Unicode compliance, HTTP communications and the ability to handle non-XML data. A report from Gartner Group Inc. in Stamford, Conn., notes that "Tamino is especially well suited for organizations to integrate information from many different platforms and formats and send it to business partners or customers."

"Tamino has both straight XML and specially indexed search capabilities," says Tamino developer Klaus Fittges. Tamino has an elegant query language

that enables short but powerful queries that would twist SQL into pretzels. "SQL can't handle queries to an arbitrary depth," observes Mike Champion, senior research and development adviser for new technologies at Software AG.

Other native XML databases include dbXML, eXcelon and X-Hive/DB. The eXcelon Data Server from eXcelon Corp. in Burlington, Mass., includes an object-oriented XML database that stores, manages and distributes native XML. X-Hive/DB, from Rotterdam, Netherlands-based The Connection Factory, works with JDBC-compliant relational databases. The dbXML Group LLC in Scottsdale, Ariz., is still developing dbXML, but Kimbro Staken, the company's chief technology officer, comments that "the thousands of downloads of our pre-alpha Core Version illustrates the booming interest in native XML databases."

Allen, Texas-based Wireless Dimensions Corp. is one user of the Tamino

native XML database. It is developing an application called Mobile-Venue Suite that will let sports fans use mobile phones and other wireless devices to access a variety of services when they're in or near ballparks or other sports venues. Users will be able to check scores and statistics, order merchandise and food and have it delivered to their seats and test their expertise with trivia quizzes. Rollout is expected by the end of this year.

"XML's hierarchical features are helpful for several aspects of Mobile-Venue Suite," notes Leslie Townsend, vice president of marketing at Wireless Dimensions. "Services differ for box seats and other seats in a venue, for example. The trivia quizzes also have stepped levels of skill." Since the application must work in real time over wireless channels, performance and reliability are additional concerns.

The XML database choice was a natural, says Scott Cote, Wireless Dimensions' CTO. "Not everything maps to a relational table. You can force it, but you only have to denormalize it again for performance. Plus, we're dealing with text, not objects, so an object-oriented database didn't make sense either." XML, however, is an effortless fit for data such as sports statistics, where one set of facts (say, a list of scoring leaders) links naturally to another (a capsule of one player's statistics).

The ability to generate device-independent output from XML for use in Wireless Markup Language- or HTML-equipped devices is also crucial. "Software AG is a well-established company, so we can have confidence in new technology like Tamino," says Cote.

Fourthought is a consultancy mainly concerned with middleware and database integration, a great deal of which is Web-based and XML-oriented. Ogbuji has experience with a number of XML databases and says he finds that "eXcelon works very well for people familiar with object databases."

Oddly, one of the main criticisms of native XML databases is performance. Some foresee problems with searching for information that may lie near the end of a large document. With no other mechanism in place, a native XML database would have to slog through the whole document to complete the search. (Relational and object-oriented databases would probably dodge this difficulty by breaking the document into smaller pieces, each searchable more rapidly.)

However, this isn't an insurmountable difficulty, provided you index each document when you store it.

"Tamino's indexing capabilities make up for any downside to searching through large documents," Cote points out. "Performance is the main issue for us. Native XML storage eliminates unneeded translation operations."

USEFUL RESOURCES

- **Discussion of how XML and databases relate:** *www.rpbourret. com/xml/XMLAndDatabases.htm*
- **Discussion of XML-enabled and native XML databases, and associated tools:** *www.rpbourret. com/xml/XMLDatabaseProds.htm*
- **Fourthought Inc. consultants:** *http://Fourthought.com*
- **Microsoft SQL Server and XML:** *http://msdn.microsoft.com/workshop/ xml/articles/xmlsql/sqlxml_prev.asp*
- **Oracle and XML:** *http://technet. oracle.com/tech/xml/info/htdocs/ relational/index.htm#ID79*
- **White papers on consultants with analysis of XML data servers:** *www.xml-data-servers.com/*
- **Developers of dbXML:** *www.dbxmlgroup.com*
- **Developers of eXcelon:** *www.exceloncorp.com/*
- **IBM DB2 and XML:** *www-4.ibm.com/ software/data/db2/extenders/xmlext/*
- **Lotus Domino and XML:** *www.lotus. com/developers/devbase.nsf/ homedata/xml*
- **Software AG's Tamino:** *www. softwareag.com/ tamino/default.htm*
- **Application using XML:** *www. wirelessdimensions.net/mvs.html*
- **Developers of X-Hive/DB:** *www.x-hive.com*
- **Source of XML information:** *www.xml.com/*
- **XML database industry initiative:** *www.xmldb.org*
- **XML conference information:** *www. xmldevcon2000.com/conference.html*

> ## NOT EVERYTHING MAPS TO A RELATIONAL TABLE. YOU CAN FORCE IT, BUT YOU ONLY HAVE TO DENORMALIZE IT AGAIN FOR PERFORMANCE.
>
> **SCOTT COTE, CTO, WIRELESS DIMENSIONS**
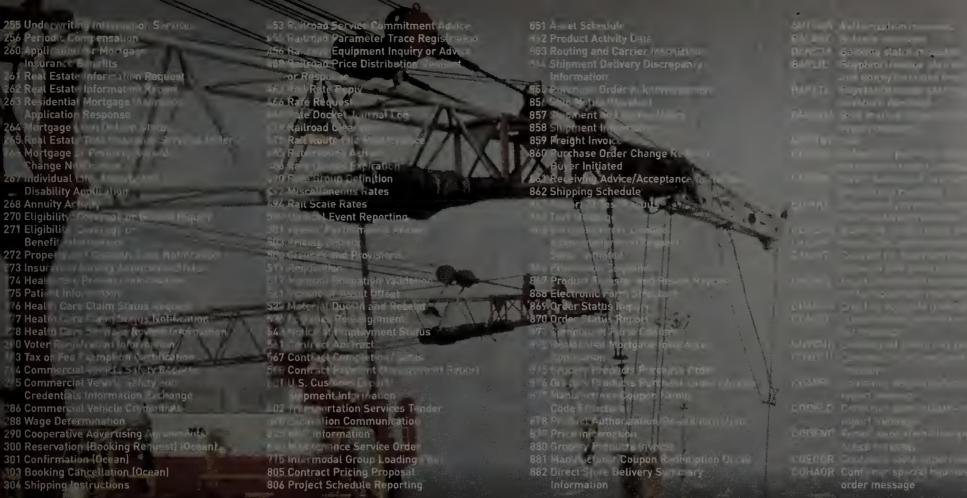
Ogbuji agrees: "Tamino is very fast."

Software AG says it has plans for Tamino, both internally and externally. It will be integrated with other Software AG products to permit even simpler access. Also in the works are a style sheet translation engine and new security elements to govern access. In addition, Tamino — currently available for Windows NT, Windows 2000, Solaris and The Santa Cruz Operation Inc. Unix — will appear on more platforms, including Linux and some mainframes.

Many of the major database vendors are incorporating XML support into their products or providing tools for using XML with their databases. IBM has an XML Extender for DB2 to let you store XML documents in DB2 databases; and new functions assist you in working with XML structured documents. Microsoft Corp.'s SQL Server 6.5 and 7.0 use extensions for working with XML. SQL Server will one day include an XML output option for passing information to other systems. "Oracle has the broadest range of enterprise features and a powerful XML indexing engine," Ogbuji says.

In addition, many say they expect that the database biggies will soon offer their own native XML databases response to demand for XML processing that Web-based e-commerce applications will require. This will let information technology departments that must buy from specific vendors have their cake and eat it too, getting native XML functionality from their approved vendors.

Demand for XML will expand; new uses will include Internet search engines that use XML tags, e-commerce systems that must produce output rapidly, electronic data interchange with XML tags, data reuse and content personalization. The move to XML databases to handle such applications will proceed in turn. ◗

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You Can Take It With You

IF YOU USE a PDA, a laptop or some other handheld device with a Compact Flash or PC Card slot, IBM's MicroDrive can dramatically increase its storage

WHEN I TRAVEL ON BUSINESS, I try to bring along every file that relates to the customer I'm visiting. I'll also take files that relate to other things that may come up while I'm on the road. And finally, I like to have a couple of solitaire and golf games to pass the time while I'm sitting in the airport departure lounge. Oh, and . . . well, you've got the idea.
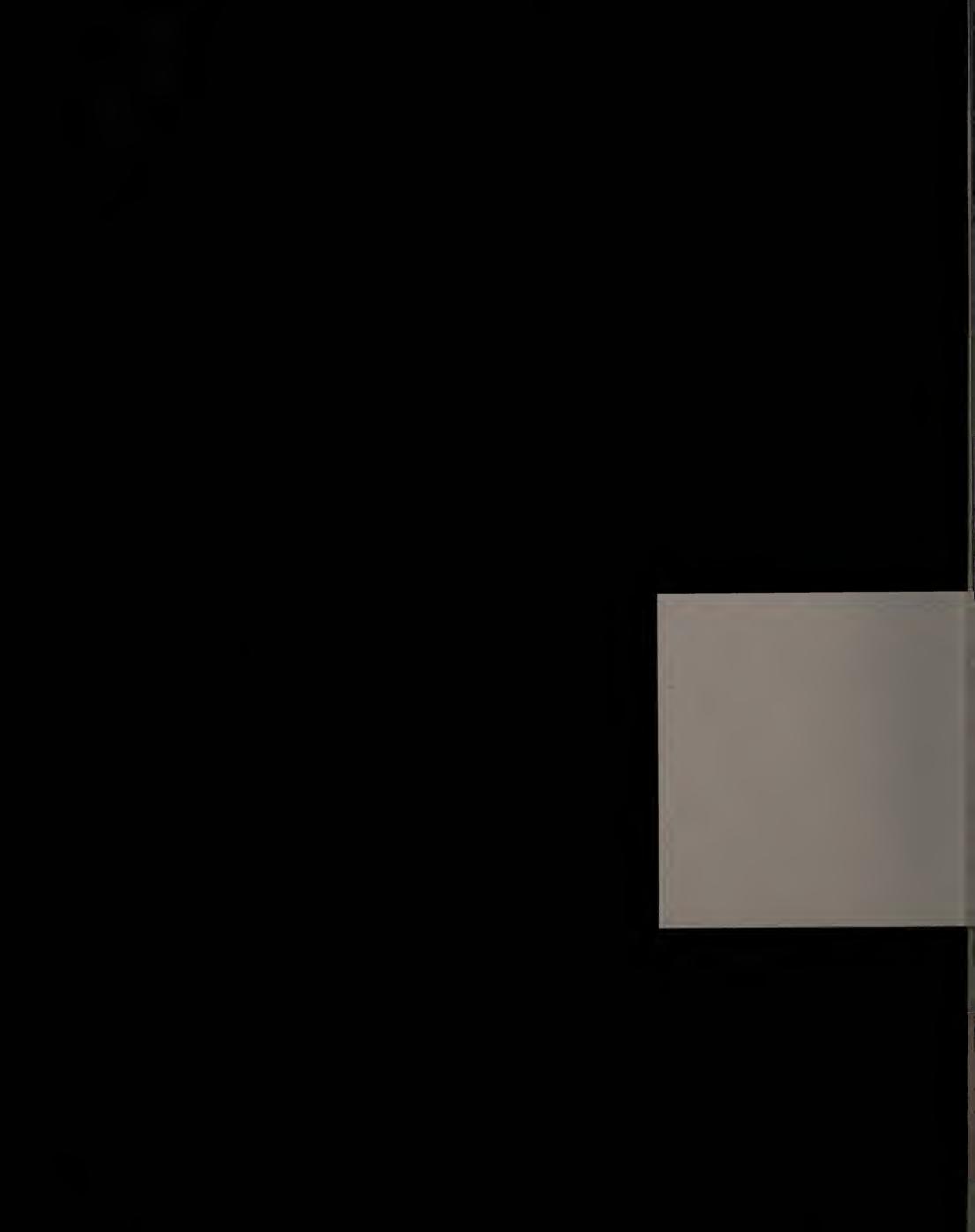
I've tried virtual hard drives at sites such as *www.idrive.com*, where you store your files on an Internet-accessible server, but that approach works only if you can get connected to the Internet. When you're traveling, there are bound to be times when that's not an option. Besides, it's simply not as convenient as when you have the data right at hand.

The answer is to look over the increasing number and types of external storage devices and pick the one that offers the best blend of cost, compatibility and capacity to meet your specific needs.

With the rapidly increasing storage capacity offered by solid-state devices such as Compact Flash and the Memory Stick, and miniaturized hard drives such as IBM's convenient 1GB MicroDrive, it's now easier to just take everything with you and not have to bother to pick and choose.

Larger-capacity devices, such as the 20GB and 30GB LaCie PocketDrives, are especially well suited for transporting video, collections of high-resolution still images and multiple mixed-media files, such as presentations.

Today's removable storage devices are a lot more capacious than floppy disks ever dreamed of being — up to 30GB and counting. By Howard Millman

■ **IBM MicroDrive**
IBM, San Jose
(888) 426-5214
www.storage.ibm.com
1GB, $499; 512MB, $399; 340MB, $299

IBM introduced the world's first gigabyte-capacity disk drive in 1980. It was the size of a refrigerator, weighed 550 lbs. and cost $40,000. In comparison, its new MicroDrive is smaller than a matchbook, weighs less than an ounce and sells for less than $500.

At 1.5-in. square, the ultraminiature drive stores an ample 1GB — more than enough to carry all the data you might routinely need. Smaller models are also available. These matchbook-size drives are made to fit a Type III Compact Flash slot, and they also mate with a special PC Card adapter that's included in the package. The drive transfers data at 4.2M byte/sec. Powered by the computer, it needs no batteries or power brick.

On a recent business trip, I took along the MicroDrive, loaded with everything I might need: spreadsheets, presentation slides and documents. With plenty of space left, I added a Washington street map and restaurant guide — something I could never do with the 1GB hard drive on my vintage Compaq Computer Corp. Armada. From a purely practical perspective, the MicroDrive immediately doubled the Armada's storage capacity without my having to send it off for service.

If you use a personal digital assistant (PDA), a laptop or some other hand-held device with either a Compact Flash or PC Card slot, you can use the MicroDrive to increase its storage. It also works in some digital cameras.

It's also very handy for moving information. I routinely transferred information back and forth between my Hewlett-Packard Co. Vectra desktop, the Armada and a colleague's desktop, with no special drivers needed. And the drive ran fine even after an accidental 4-foot drop onto a hard floor.

■ **LaCie PocketDrive**
LaCie USA, Hillsboro, Ore.
www.lacie.com
(503) 844-4500
10GB, $399; 20GB, $749; 30GB, $1,299

LaCie is likely to have a drive for you, no matter how much data you need to transport. The capacity for the PocketDrive family of external hard drives ranges from 10GB to 30GB. Despite the implication of the name, the devices are a bit too bulky (3.5- by 5.75- by .5-in. thick) for easy portability. At 13 oz., the weight could prove to be a problem for travelers. What's more, PocketDrives require their own software driver, which can complicate transferring data to someone else's computer, even if you remember to carry the CD-ROM drive with you.

On the plus side, the PocketDrive offers a choice of interfaces: a Universal Serial Bus (USB) or the technically superior FireWire (IEEE 1394), which transfers data at speeds up to 50 to 100 times faster (between 12M and 45M

LaCie PocketDrive

byte/sec.) than a USB. At that rate, you can capture a video stream in real time. In fact, that's what FireWire's developers, Apple Computer Inc. and Texas Instruments Inc., designed it to do.

Under some conditions, the FireWire model can draw power from the computer, eliminating the option of leaving the power adapter back at the office. Not all FireWire ports, however, provide adequate power. You'll need to check the specs on your computer or its add-in cards. None of my three computers has a FireWire port, so I didn't test that feature.

■ **LS-120 SuperDisk**
Imation Corp., Oakdale, Minn.
(800) 466-3456
www.superdisk.com
External USB, $150; internal IDE, $100

A high-density floppy-disk drive replacement, the LS-120 stores 120MB of data. Unlike competitor Iomega's 100MB and 250MB Zip drives, the LS-120 can also read and write to a standard 3.5-in. floppy disk. It's about 20 times faster in read/write speeds than a floppy disk. The new drive spins at 1,440 rpm, twice the speed of the original design introduced in 1996. Along with other technical improvements, the LS-120 exchanged data three times faster than the original parallel-port model in my file-transfer tests.

Imation offers three models: an internal integrated drive electronics (IDE) drive, an external parallel-port model and the external USB model, which I tested. Although the USB model is easy to connect and disconnect and is the size and shape of a hardcover book, it's too bulky to carry around easily. Like the LaCie Pocket-Drive, the LS-120 requires its own software drivers, which can limit its interoperability.

The LS-120 offers the best value and overall usefulness when used as a high-speed, high-capacity replacement for an internal 3.5-in. floppy-disk drive.

■ **Memory Stick**
Sony Electronics Inc., Park Ridge, N.J.
www.sony.com
(800) 222-7669
32MB, $80; 64MB, $140

Sony Electronics would like to stick it to you, at least when you're in the market for removable memory. About the size of a stick of chewing gum, Sony's solid-state Memory Stick is available in capacities of up to 64MB, which is good for storing about 80 minutes of compressed audio or 1,000 still images. A 256MB model is due early next year.

It's especially handy in devices designed to accept the Memory Stick directly, such as a digital camera, an MP3 player or Sony's VAIO notebooks. I took several pictures with a Sony digital camera, removed the Memory Stick, slipped it into a Sony PC Card adapter ($80) and plugged it in to my HP Vectra's PC Card reader. The files were immediately accessible, with no drivers needed.

Sony is working hard to make its proprietary Memory Stick a standard, in the face of competing solid-state memory formats. To date, the company has lined up 45 licensees, including Palm Inc., Casio Computer Co., Acer America Corp., Olympus America Inc., Sanyo Electric Co., Sharp Corp. and Seiko Corp. By offering

SanDisk's CompactFlash

an appealing uniformity across a variety of products, transferring and transporting modest amounts of data becomes much easier.

On the other hand, SmartMedia and CompactFlash already do that, and they're widely supported, especially in digital imaging products. What's more, another new format, the SanDisk Corp./Siemens AG MultiMedia Card, is even smaller and has comparable capacities. And Toshiba, working with partners IBM and Sunnyvale, Calif.-based SanDisk, is developing a competitive solid-state memory format with a projected capacity of 1GB.

Which One?

With the list of vendors offering proprietary external storage devices growing rapidly, industry analyst Jim Porter at Mountain View, Calif.-based Disk/Trend Inc. recommends that you pick a product based on whom you intend to share the data with.

"If you want to exchange data between computers that you own, then any affordable device with an adequate capacity will do. If you plan to exchange the files with other people, buy two and give one to them," he recommends with a hint of humor. And after all, if you do plan to take it with you, that's one way to make sure it's usable when you get there. ▶

Millman is a freelance writer and consultant in Croton, N.Y. Reach him at hmillman@attglobal.net.

SONY'S HOPING its Memory Stick will become a standard

Solution Center

Online in Coming Months

Feature Articles

Fulfilling A Vision for Global E-Business: BP and WorldCom

BP's vision is clear: it intends to play a leading role in meeting the world's growing energy needs while protecting the environment and promoting safety around the globe. But to fulfill its vision, the company realizes that it must deliver more than outstanding human resources and global organization. BP must lead the way in developing cutting-edge technologies that will help it reach out to local communities, customers, contractors, partners, governments and employees.

Making 900 Offices One

IKON Office Solutions, based in Malvern, Penn., grew through acquisition in the mid-1990s to become a global leader in the office technology market with more than 900 locations today in the U.S., Canada and Europe. To support the company's growth and enhance delivery of its products and services, IKON turned to WorldCom to build its e-business infrastructure for the 21st century.

Solution Center will have a story about transforming a call center into a Web-based multimedia contact center. As businesses roll out a dizzying array of ways for communicating with their most vital assets — customers — the one-dimensional call center is being transformed into a Web-based multimedia contact center that can accommodate telephone calls, Internet-generated leads, e-mail and chat.

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Storage Resource Management

BY ELIZABETH M. FERRARINI

WHICH employees gobble up the most disk space, and why? What's the best way to partition disk space on a storage-area network (SAN)?

Some savvy information technology professionals won't have any trouble clicking on the answers to those questions. They use data from a storage resource management (SRM) tool to identify and prevent capacity or performance problems and to plan for future storage growth.

Unlike tools that handle storage management tasks like backups, SRM tools provide a central view of either physical storage resources such as RAID systems, tape libraries and SAN switches or of logical storage objects such as volumes, files, users, database tables and I/O.

SRM tools fall into 10 distinct application disciplines: asset management, capacity management, chargeback, configuration management, data/device/media migration, events management and alerts, performance management, policy management, quota/space management and removable media management. Most SRM tools combine several disciplines and were designed to work on specific operating systems such as Windows NT or Unix.

Practically all SRM tools offer two levels of functionality: Monitoring and alerting features (on-screen, e-mail or paging) provide for day-to-day maintenance of storage resources; reporting and trending features provide for long-term maintenance and planning.

SRM tools usually consist of a service that runs and manages the application from a Web-based central console or graphical-user-interface-based central console, a mechanism

DEFINITION

Storage resource management (SRM), a subset of storage management, consists of a class of tools that monitor, alert and report on the health, configuration, availability, performance and usage of specific or distributed networked storage resources.

SRM Disciplines at a Glance

ASSET MANAGEMENT tracks and keeps records of all physical storage hardware on a network.

CAPACITY MANAGEMENT compiles real-time and historical data about physical storage media such as disks and about logical storage resources on a network, such as unused space on specific volumes.

CHARGEBACK acts as an accountant for billing end-user departments for used storage capacity and other storage-related network resources.

CONFIGURATION MANAGEMENT determines how to best arrange current physical network storage such as a disk subsystem and SAN switches.

DATA/DEVICE/MEDIA MIGRATION enables large amounts of data, such as a data warehouse, to be moved from one system to another.

EVENTS MANAGEMENT AND ALERTS notify systems administrators of errors with storage devices in the network, such as a hard-drive failure, and record all events.

PERFORMANCE MANAGEMENT provides an ongoing view of application, server and subsystem performance, such as excessive I/O from application servers.

POLICY MANAGEMENT specifies rules or policies for managing hardware, files, users, schedules and media.

QUOTA/SPACE MANAGEMENT optimizes disk usage by assigning specific space allotments to end users and reclaiming wasted space.

REMOVABLE MEDIA MANAGEMENT maintains a history of on- and off-site tape, optical storage and other media.

for scanning monitored resources, a database that stores collected data from monitored resources and a report generator that can output information in various formats such as Excel spreadsheets or HTML. By supporting Simple Network Management Protocol, an SRM tool can also be administered from network management systems such as Tivoli Storage Network Manager from Tivoli Systems Inc. in Austin, Texas, and Hewlett-Packard Co.'s OpenView.

"Some systems administrators haven't a clue about how much storage they have or how it's being used, until it's too late," says John Webster, a storage analyst at Illuminata Inc. in Nashua, N.H. "SRM tools can provide all the answers and can ward off an outage."

Key Functions

For example, SRM tools that combine the disciplines of quota/space management, capacity management and performance management let IT professionals know what their disk-space consumption looks like and how to distribute it evenly as a shared resource.

SRM systems' key functions for maintaining day-to-day space consumption and storage performance include the following:

■ Determining disk-space usage as a result of thresholds on a user's home directory or a department's folders, getting alerts when thresholds are about to be reached or exceeded and responding to alerts.

■ Running HTML usage reports that enable employees to easily clean out their quota space.

■ Setting filters to keep non-business file types such as MP3s and .vbs files from being saved on the network.

■ Setting thresholds on I/O performance, getting alerts when thresholds are about to be reached or exceeded and correcting any problems.

■ Identifying specific storage resources, such as disk drives that are most likely to fail or are about to run out of space, and taking steps to prevent failures.

■ Locating and filling any gaps in backup routines.

SRM systems include the following key planning functions:

■ Locating areas of unused space and setting up a policy for reallocating that space through file migration to secondary storage.

■ Tracking the growth of files and assessing their implications for file migration, backup and archiving operations.

■ Tracking file usage to make decisions about load balancing.

■ Identifying growth trends, such as which applications are growing fastest.

■ Making decisions about the best way to handle that growth, such as consolidating servers or using a SAN.

Some vendors are planning to enhance their SRM tools with more application disciplines, especially data/device media migration and policy management. Webster says future tools will need to manage multiplatform pools of storage, with views of the storage facility, the attached servers, their operating systems, the file system and the storage internetworking components.

This type of SRM tool could provide a panoramic picture of all storage resources. It could give a systems administrator proof that one port on a SAN switch is causing a bottleneck on an Exchange server or that the slowest disk in a RAID storage system has the most-used table in an Oracle database. ▶

Ferrarini is a freelance writer in Arlington, Mass.

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that makes you say, "Wow."

A pricetag that makes you say, "How?"

Epicentric Opens Doors to E-Commerce

Vendor start-up creates, manages multiple portals in a single framework

BY AMY HELEN JOHNSON

NETSTAFF INC., an electronic marketplace for the staffing industry, faced a problem common among online businesses: how to motivate people to stay at its Web site.

James Fisher, manager of technical operations at the San Francisco-based company, says Netstaff's solution was to bring information to its site — like maps, news and stock quotes — that its visitors usually went off-site to find, and to combine those with specialized content about staffing and the NetStaff recruiting application. "We're providing a one-stop home page for a professional in the staffing industry," Fisher says.

But producing portals isn't one of NetStaff's core competencies, says Fisher. So he turned to San Francisco-based Epicentric Inc., which builds software to set up and manage portals.

Unusual Approach

What's different about Epicentric's approach, says CEO Michael Crosno, is that it makes it easy to establish a network of portals under a common management structure. This means businesses can present different portals for different purposes, without building multiple independent sites.

Hadley Reynolds, director of research at The Delphi Group in Boston, says Epicentric's ability to combine different sources of information — outside syndicators, internal data streams and Web-based applications — and to set up different views of that information is the right approach. "The reality is that there are going to be multiple portal views," he says.

Epicentric's main product is Epicentric Portal Server, the framework for the portal network. Portal Server is a hierarchy of Web sites targeted at the needs of different groups. The key to the product's ease of use is a master portal that pushes content to subportals.

A permissions policy gives owners of these subportals the ability to add content and services to the central stream, tailoring the display to the needs of their particular group. Crosno says the business benefits of this combination of centralized and distributed content management are faster deployment and lower operating costs.

Epicentric also offers its Portal Server as a hosted service, and it has relationships with content syndicators such as financial, headline, sports and weather news suppliers.

Reynolds says one of Epicentric's strengths is that it has successfully created an open implementation of its framework, which allows it to forge alliances with other suppliers and comply with their customer's wishes for open systems. "From the implementer's point of view, they don't want a new proprietary environment to tussle with," Reynolds says.

An open architecture also makes it easy for Epicentric to handle the heterogeneous content sources and application environments that enterprises want to consolidate in their portals, he says.

Winning Concept

The network concept was one of the things that sold Altra Energy Technologies Inc. in Houston. The energy exchange started as an Epicentric customer and then decided to partner with the company to sell private-label versions of Epicentric's products to energy companies.

Altrade, Altra's traders' portal, combines weather, mercantile exchange data and analytical and charting tools with a transaction application to give users the information they need to research and conclude spot trades, says Ahmad Atwan, Altra's vice president of electronic-business solutions. "It's allowed us to really serve our customers on a very personalized, real-time basis," he says.

Epicentric is targeting Fortune 1,000 companies moving toward electronic business, says Crosno, as well as business-to-business exchanges and business-to-consumer dot-coms. Crosno declined to discuss specifics about the company's revenue but boasts about capturing one to two new customers per week.

That fast growth, he acknowledges, is a threat to the company. Keeping on track means staying focused on the delivery of Epicentric's architecture while scaling the organization, Crosno says.

The company's goal is to provide better integration between its offerings and other platform vendors like exchanges and to increase services for vertical markets, Crosno says. "We think customers want a whole set of services, including content, applications, transactions and collaboration," he adds. ▶

Johnson is a freelance writer in Seattle.

"WE THINK customers want a whole set of services," says CEO Michael Crosno (center, with Ed Anuff, left, and Oliver Muoto)

Epicentric Inc.

Location: 333 Bryant St., Suite 300, San Francisco, Calif. 94107

Telephone: (415) 974-0280

Web: www.epicentric.com

Niche: E-commerce Web site development

Why it's worth watching: Portal network approach allows creation of specialized information sets while maintaining one root set of content and services

Company officers:
• Ed Anuff, co-founder, chairman and vice president of products and services
• Michael Crosno, CEO
• Oliver Muoto, co-founder and vice president of market development

Milestones:
• November 1997: Founded
• July 1999: First product introduced

Employees: 190; 400% growth per year

Burn money: $44.5 million from Autodesk Inc., Bowman Capital Management LLC, Chase H&Q and others

Product/service pricing: Epicentric Portal Server starts at $200,000. Epicentric Hosted Services starts at $10,000 per month; the price for Epicentric Syndicated Services varies with content.

Customers: NetStaff, The Chase Manhattan Corp., U.S. Postal Service, Autodesk and GoCampus Inc.

Partners: Altra Energy Technologies, Open Text Corp., @TheMoment Inc. and Semio Corp.

Red flags for IT:
• Can the company continue to execute well at this growth speed?
• Competition may come from blue-chip technology leaders who are eyeing the market.

A Flood of Competition

Hadley Reynolds, director of research at The Delphi Group, says he sees a portal-server market flooded with competitors. "This is not a two-player race by any stretch of the imagination," he says.

In fact, Reynolds adds, there are more than 50 players in this market space. Some, like Epicentric, are start-ups. But with a company's online or electronic-business presence increasingly becoming an extension of its core network, Epicentric is also facing IT infrastructure powerhouses like Sybase Inc. in Emeryville, Calif.; Computer Associates International Inc. in Islandia, N.Y.; IBM; Microsoft Corp.; and others. These companies want to build or expand products to serve as portal frameworks.

And Reynolds says the new companies will soon be feeling a cash crunch. Investor jitters, especially about technology companies that are in the red, have closed the door on initial public offerings, and some companies are going to be hurting beginning in the second quarter of next year. The vendors that survive will have open architectures and many strong partners, he says.

Corporate Portal

Plumtree Software Inc.
San Francisco
www.plumtree.com

Plumtree is now on Version 4.0 of its Corporate Portal, which has many of the same features as Epicentric Portal Server. This product aggregates applications and content from different sources, such as documents, database reports and Internet channels. It also includes tools for creating a portal accessible by customers and partners outside the firewall. Plumtree has allied with third parties to produce content and services that users can incorporate into portals.

XML Portal Server (XPS)

Sequoia Software Corp.
Columbia, Md.
www.sequoiasoftware.com

Sequoia built XPS with an XML-based, dual-server architecture. One server, XML Application Server, handles the messaging for transactions, while the Content Delivery Server is the gatekeeper to the content. Like Epicentric, XPS has a centralized management console that lets a key administrator develop sets of portals. Sequoia has exploited its XML architecture to provide wireless portal access.

— Amy Helen Johnson

Opportunity no longer knocks. These days, it darts past the door before you can even react.

With the explosion of e-commerce, the old rules of competition have been thrown out the window. To remain even one step ahead today you need immediate access to the best data available. And software that quickly converts it into knowledge you can act on. Which is precisely why 98 of the FORTUNE 100 count on SAS, the world leader in data mining and e-Intelligence. SAS enables you to capture, integrate, explore and analyze information from across your entire enterprise. To recognize and seize opportunities at the speed of the Web. And to make competitive decisions with greater confidence than ever before. To learn more on how we can propel your organization, call 1-800-727-0025 or stop by **www.sas.com**.

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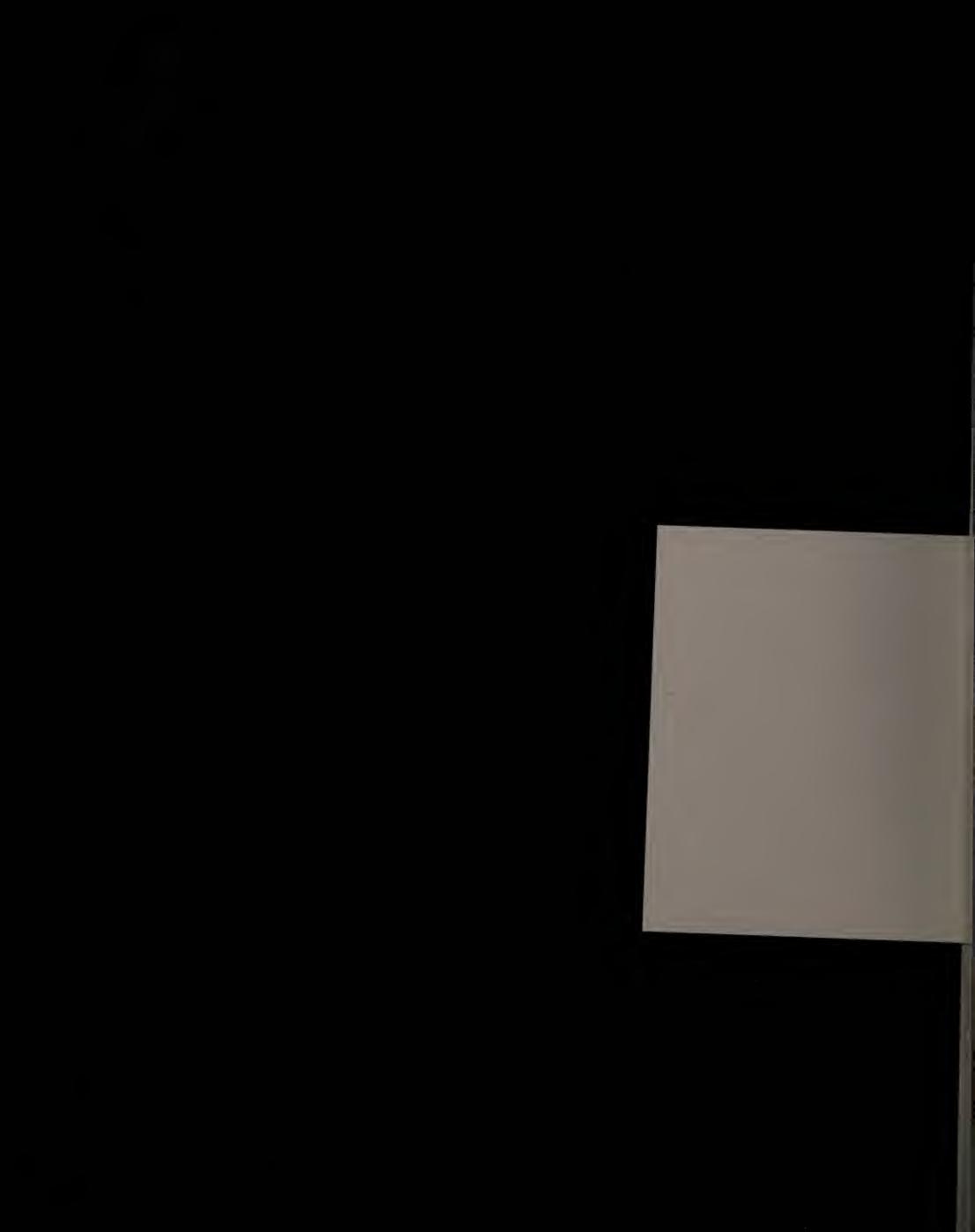
All your servers backed up in a preposterously small amount of space. Lots of drives, huge capacities and connectivity to everything you own. And the new Spectra 64000 is just one of the many rackmountable tape libraries we offer. But no matter which one you choose, you'll always get the most terabytes in the fewest U's on the planet. Park lots. Go get more. There's plenty of room. For the skinny on any of our products, call toll-free 1-866-249-9966 or visit www.spectralogic.com/small-is-big.

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Harvesting The Dot-com Discontent

STEVE SODEBERG of the Robert Mondavi winery is seizing the opportunity to recruit disenchanted IT professionals

JOHN HARDING

What a difference a year makes. Last year, dot-coms were the recruiting rage, stealing actual and potential talent from IT departments everywhere. Now, many of those staff-challenged employers are finding they offer the better salaries, saner schedules and more fun environments.
By Holly Hubbard Preston

WHEN STEVE Sodeberg joined wine-maker The Robert Mondavi Corp. as its chief technology officer four years ago, he was convinced it would be an easy place to recruit programming and development talent.

A former Cisco Systems Inc. executive, Sodeberg saw the sprawling Oakville, Calif.-based winery as a place where an information technology professional could strike an ideal work/life balance and still be both professionally challenged and soundly compensated.

But Sodeberg had his work cut out for him. As one of the biggest booms in the history of the U.S. stock market hit the IT industry, dot-coms swept away much of the available IT talent in the San Francisco Bay area. Sodeberg, like many brick-and-mortar IT executives, felt as if he had dropped off the job-hunter's map.

But now he's back on that map, well armed.

His arsenal includes salaries that he says are as good as or better than what many dot-coms can offer, a host of one-of-a-kind IT projects that are in need of stewardship and an excellent chance for an eight-hour workday.

Taking Advantage

A year ago, dot-coms were the darlings of IT job-seekers. Now, amid the current wave of dot-com failures, many are at the bottom of the preferred-employer list. So Sodeberg is feeling bullish about his recruitment prospects. And that's a good thing: Mondavi's IT demands are quickly outgrowing Sodeberg's staff of 30.

Mondavi, which will pro-duce about 8 million-plus bar-rels of wine this year, relies heavily on a range of computers to manage its wine-making process. IT tracks everything from the collection of grapes and the sugar levels they yield to the barrels in which they are stored and the distributors who move them out to market.

A proprietary software program built in-house with Powersoft's PowerBuilder with a SQL Server back end serves as Mondavi's primary harvest-management system. It runs across a collection of wide-area networks, virtual private networks and intranets. The plan is to extend the system even further throughout Mondavi's nationwide operations while enhancing its ties to the winemaker's third-party grape growers and distributors.

"For the right person — someone who wants a good work/life balance — this company and this industry is a great place to be," Sodeberg says.

Wine-making is just one of dozens of brick-and-mortar industries that fell off the radar screens of many IT job seekers during the past couple of years.

Like Mondavi, employers in these industries see the recent spate of dot-com failures as an opportunity to bolster their profiles in the IT job market.

Now, it's often the user companies in a job market that can promise hot projects, high pay and employee empowerment.

Healthy Opportunities

Take health care, for instance. Though traditionally a high-profile employment sector for IT professionals, it, too, has found itself pushed into the shadows by stock-wielding dot-com start-ups.

Although he may not be able to offer stock options to his employees, Bob Rosecrans, CIO at Chicago-based health care insurance provider Blue Cross/Blue Shield Association, says he's prepared to compete for good IT talent.

Rosecrans says there are at least 15 IT staff openings in the association's Washington and Chicago offices. The insurance provider is in the midst of a massive push to shift its current legacy-system-reliant business model to the Internet, where it plans to support member doctors and patients in a real-time environment.

Rosecrans is looking for professionals with experience in IBM's MQSeries messaging technology, Java and object-oriented programming. In particular, he's looking for project managers — folks to oversee teams of programmers and designers on individual projects.

It's a far cry from the traditional C++ and Cobol administrative-level programming his staffers did in the past, Rosecrans says. Although he won't disclose salary levels, he's adamant that he can and will pay market rate, and then some, for those who stack up.

"I have complete control over salaries and flexibility in terms of what level people come in at," he says.

Tapping the Non-Internet Market

Helen MacKinnon, president of Technical Connections Inc., a management-recruitment firm in Los Angeles, says she has a number of health care clients that are offering not only signing bonuses but also retention bonuses for people with specific skills.

MacKinnon says these companies are offering market-rate salaries starting at $70,000 for entry-level talent. And salaries go well into six digits for the more experienced professionals, she adds.
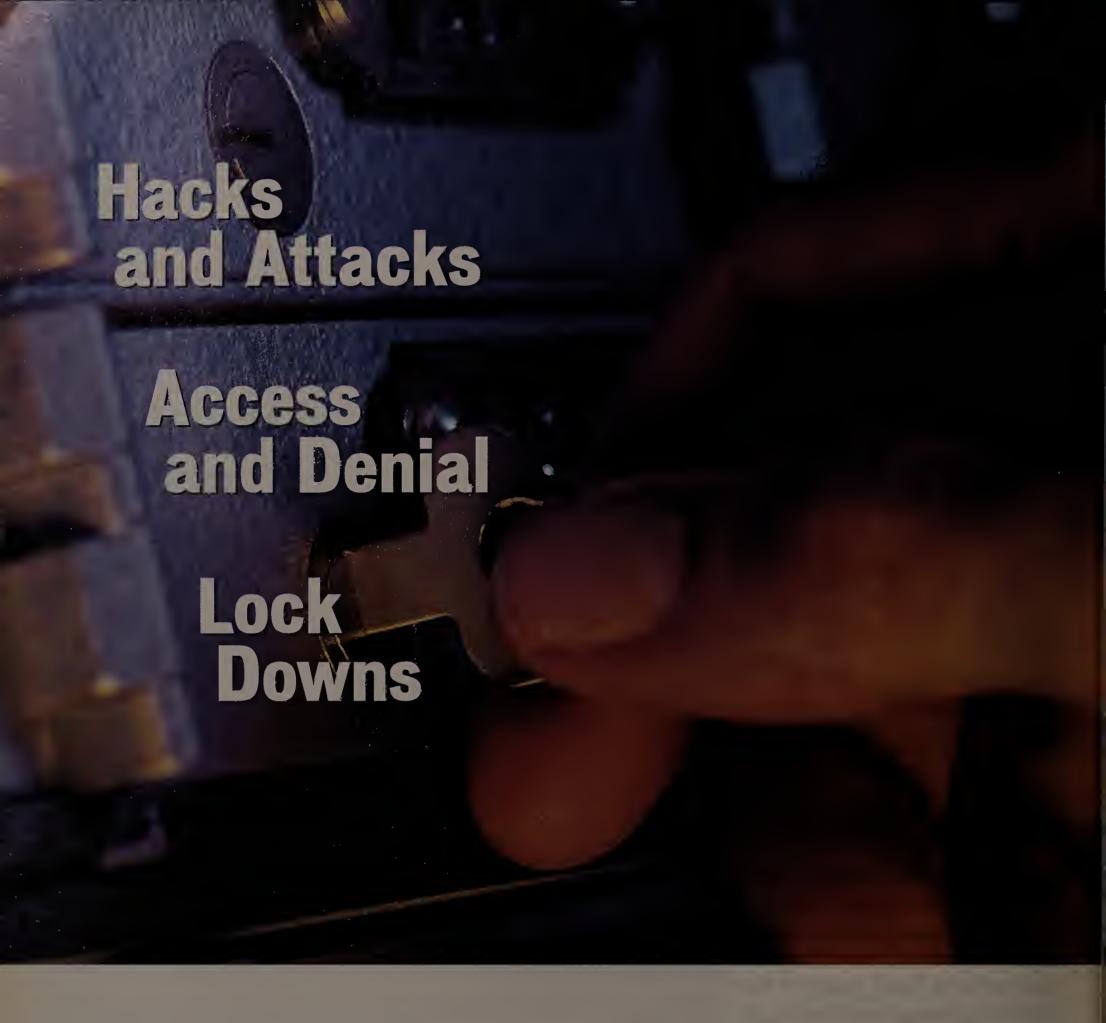
Demand for CIOs in industries such as advertising and financial services is also high. And MacKinnon says she has had difficulty attracting Web-oriented talent lately.

There's been a perception that many traditional industry sectors are somehow behind the eight ball on committing to the Internet, says MacKinnon. As a result, some IT job seekers have been avoiding user companies.

"They feel they might miss out on valuable Web experience," says MacKinnon.

While that might have been a valid concern two years ago, MacKinnon says Web experience can be garnered just about anywhere these days. She estimates that approximately 15% of all of the placements her firm is making right now involve Internet-related jobs at non-Internet companies. She says she expects to see that number grow over the next year. ◗

Preston is a freelance writer in St. Helena, Calif.

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■ IT

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Web Developer
Technical Writer - Software

■ MARKETING/SALES

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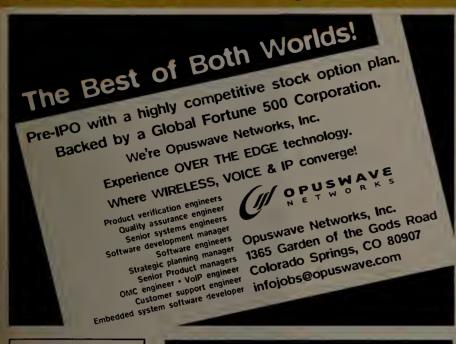
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Software Engineers

At Atlantis Interactive, an Internet and customer service solutions company, we work to take Internet projects from prototype to launch. Striving for excellence in the design and development of highly customized web sites, we change the way business is done over the Internet.

Due to our growth, we are in need of Software Engineers. In this role, you must have significant technical experience with excellent communication skills and an enthusiastic and entrepreneurial personality. Ideal candidates will be well versed in object oriented software engineering, software architecture, Com/D Com, Java, C++ and Oracle Development.

We offer exciting and competitive compensation and benefit packages. Only qualified applicants will be contacted. Interested candidates should forward their resumes to **Human Resources, Attn: Garry Randall, Walker Digital Corporation, Five High Ridge Park, Stamford, CT 06905.** No phone calls please. An Equal Opportunity Employer. M/F/D/V.

Atlantis Interactive

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Sr. Java Developers needed for NJ IT Co. to dsgn & dvlp s/ware applics for portals using Java & XML & dvlpg portals using Sapphire/web. Apply to: R. Gorga, Bluestone Consulting, 1000 Briggs Rd, Mt. Laurel, NJ 08854.

COMPUTER-SENIOR SYSTEMS ADMINISTRATOR-Investment management firm seeks senior systems administrator to manage & maintain trading system network at Long Island site. Requires 2-3 years experience & strong Unix & Solaris skills & IT security experience. Salary commensurate with experience. Send resume to: RTC, 600 Route 25A, East Setauket, NY 11733-1249, Attn: JRDW

Technical Marketing Manager: Within the areas of e-commerce and ERP solutions, network, system and database administration, responsible for marketing Software products and services. Also responsible for managing strategic business opportunities, understanding client e-business requirements and developing client base. Additional responsibilities include developing and executing marketing plans, managing sales and services meetings, assessing IT trends and reviewing competitive marketplace. Requires M.B.A. in Business Administration or Marketing and 2 years of professional experience marketing software and system integration services. 40 hrs/wk (8 to 5) $77,973/yr. Send two (2) copies of resumes/responses to Job Order # 2000-480, P.O. Box 989, Concord, NH 03302-0989.

Strata Solutions Inc is seeking software developers for high-end commercial and operations software with experience including several of the following: Oracle, Sybase, Informix, SQL Server C, C++ VB, PB MRP, ERP, CIMPLICITY Mainframe technologies.

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Software Engineer. 8a-5p; 40 hrs/wk. Plan, dvlp, test & implmt comp prgms and hardware interface using Oracle, Oracle Forms, Dvlpr 2000, Power Builder, VB, C, C++, Unix. Masters or equiv w/major in Comp Sci, Electronics or related field of engg. In lieu of Masters, can have Bachelors in specified majors AND 5 years of progressive experience. Send resume w/ref.# 002: HR Mgr, Unilinx, Inc, 4625 Alexander Dr., Ste 110, Alpharetta, GA 30022.

Software Consultant
Provide services to clients relating to design & development of multi business applications with Oracle, SQLBase, Sybase & DB2; debug test, & document applications, design data files, create tablespaces, tables, & table index keys ; provide security access, install windows NT servers, & maintain sequential files in VSAM; generate reports with Easytrieve, Crystal Reports, & SQL Report Writer tools, write & code SQL programs with SQL*Edit, Query Management Facility, & SPUFI tools; debug batch & on-line programs with Xepditer; create generalized maps to avoid repetitions; create test plans for individual mode & integrated modules. $63,000/yr. 40hrs/wk. B.S. required in computer science or computer Eng. or Computer Applications. 2yrs. exp. required in job offered or 2 yrs. related exp. as Systems Analyst or Programmer Analyst. Exp. in related occupations must include use of noted skills in job duties. M.S. & 1 yr.exp. accepted in lieu of B.S. & 2 yrs. exp. M.S. or B.S. may be foreign equivalent degree. Will work at unanticipated locations in the U.S. Submit 2 resume or apply to the GA Dept. of Labor, North Metro, 2943 N.Druid Hills Rd., Atlanta, GA 30329 or the nearest Dept. of Labor Field Office. Job Order #GA6914102.

Administrator, Baan and Oracle.

Design, create, maintain and troubleshoot BaanERP environments and Oracle databases. Knowledge of BaanERP architecture and Oracle DB Administration for Baan. Install, configure, and administer BaanIV, BaanERP, Oracle, and third party interfaces. Design Oracle backup and recovery procedures. Data import and export. Troubleshoot Baan tools/applications, Baan tools process automation, software access control, security, software configuration management, software patch management, device management, license management, and automatic job management. Transfer data between systems. Tune Baan applications and Oracle databases to enhance performance. Integrate Baan software with Leasetek, Vertex, PDM, Moopi, Hyperion and Visual Basic. Create alert programs/Utilities for Critical Baan processes that run with errors. Assist local Baan/Oracle administrators in solving technical problems. Use BaanIV, BaanERP, Triton Tools 6.1 & 6.2. Baan Exchange, Oracle, PL/SQL programming. HP-UX, WindowsNT, Shell Programming and C. Requirements: Bachelor's. 5 years of progressive Post Baccalaureate experience as Systems Engineer/Software Engineer. Mail/fax to: Sensormatic, PO Box 5037, Boca Raton, FL 33431-0837. fax: 561-912-6851.

Software Developers reqd by S/ware Consulting Co. Analyze user reqmts & eval existing or proposed internet systems & devise web based comp prgms, systms & devise web based comp prgms, systms & related procedures to process data & improve production or work-flow as reqd. Dsgn & prgm internet applic sware, communicate w/users to determine problems associated w/users internet s/ware &/or h/ware systems as reqd. Provide web based prgmg solution for internet, intranet & extranet applics using such operating systems, web servers & s/ware as, not limited to, Win 2000, Win NT, Linux, Unix, MS Internet Info Server, Apache, XML, Java, VB, C, C++, MS SQL Server Oracle, HTML, DHTML, CSS. Active Server pages (ASP), Java Server Pages (JSP), client & server side VB Script, JavaScript, Jscript, Win Scripting Components Component Object Model (COM+), Simple Object Access Protocol, Active XData Objects (ADO), OLEDB, Netscape & Internet Explorer. Job to be performed in Lebanon, NH & other unanticipated client sites throughout US as assigned. Reqd: Masters & 1 yr exp. Will accept Bach +5 yrs of progressive exp in lieu of above stated exp. $71K/yr. 40 hrs/wk; 9a-5p. Responses to be submitted in 2 copies of resume/ltrs of application to: JO# 2000-471, PO Box 989, Concord, NH 03302-0989.

Director, Customer/ProductTech. Svcs. for semiconductor & SW systems linking electronic devices to communication networks. Experienced person w/BS or MS in Eng. or Comp.Sci. Resume to: J.Gibbs, NETsilicon, Inc., 411 Waverly Oaks Rd., #227, Waltham, MA 02452, fax (781)893-1338.

Leading provider of communications solutions and services for the Enterprise and e-Business seeks a Director of Application Development who will work with project executives and engineers to design application development components of customer communication solutions. Requires a Master's degree and industry experience. If interested and qualified send resume to Human Resources, Brooktrout Software, Inc., 333 Turnpike Road, Southborough, MA 01772.

Systems Analyst: Responsible for the implementation of company's treasury systems software products. Provide training and implementation support for client project managers and end-users. Write technical specifications for use by programming resources. Direct activities of Treasury Systems Analyst on site. Domestic travel 50-75%. MBA or Master's in Accounting or Finance + 3 yrs. exp. or Bachelor's in B.A., Accounting or Finance + 5 yrs. exp. 76K. Send resume to. The Phila. Job Bank, 444 N. 3rd St.-3rd Floor, Phila., PA 19123. Refer to J.O. #7064785.

Seeking computer prof. for multple positions of s/w engineers, systems analysts, P/As, DBAs, in NY, NJ, & CT, & other US locations. MS or BS Comp Sc./ Eng or equivalent, 1-5 yrs exp. with any of the following skills: C++, Java , EJB and Oracle or Sybase preferably with multimedia, financial exp. full time positions with top $$+bnfts. Send res with salary reqs to: 44-43 Kissena Blvd # 6E, Flushing, NY 11355: / fax 718.539.0004/ email selvanath@aol.com

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Senior Applications Developer wanted by Online Financial Information Co in New York, NY. Must have Masters In Comp Sci & 2 yrs applications dvlpt exp.

Respond to: Diane Vivolo, Wall Street Source, Inc., 120 Broadway, 28th Fl, New York, NY 10271.

Unix Administrators need for NJ IT Co. to dsgn, dvlp, install & configure Unix systms employing TCP/IP technology. Apply to: R. Gorga, Bluestone Consulting, 1000 Briggs Rd, Mt. Laurel, NJ 08854.

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Telecommunications Analyst. FT position available at Gateway Health System in Clarksville, TN. Will plan, design, recommend and implement telecom & network systems, hardware & software, support Lucent Definity G3Si, network and application protocols, router configuration using LAN/WAN technology, Windows NT, Novell, UNIX & C. Required B.Sc. in Comp. Science/Electrical Engineering or in related discipline & 1yr. Related work experience. Send resume to: Information Systems, 1771 Madison St., Clarksville, TN 37043.

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Sr. Software Engineer to be responsible for development of software applications using multiple databases, incl. Visual Basic, C, C++, MS Access for PC and UNIX environment. BS or foreign equiv. in Software, Computer, or Electronics Engineering; 6 yrs experience in job offered. Must have 5 yrs experience with database administration, 5 yrs with UNIX environment, 5 yrs using C/C++. All experience may be cumulative. 40 hours/wk, 7:30 a.m. to 4:30 p.m., $68,004/yr. Must have proof of legal authority to work in the United States. Send resume to the Iowa Workforce Center, 800 Seventh Street SE, Cedar Rapids, Iowa 52406-0729, Ref. #IA1101133. Employer Paid Ad.

PROGRAMMER/ANALYST to analyze, design, develop, maintain, test and support application software using Oracle, PL/SQL, Developer 2000, Visual Basic and VB Script on Windows NT platform. Require: B.S. degree in Computer Science, an Engineering discipline, or a closely related field, with one year of experience in the job offered or as a programmer; Extensive travel on assignment to various unanticipated client sites within the U.S. is required. Salary: $59,775 per year. 8:00 am to 5:00 pm, M-F. Apply by resume to: Lakshman Guttikonda, Vice President, Business Development, Konark Systems, Inc., Three Dunwoody Park, Suite 103, Dunwoody, GA 30338; Attn: Job RG.

Software Engineer with at least 18 months. exp. in XML, VB, Java, POS, VBScript, & 3 yrs. exp. in C++ urgently reqd. Travel reqd. Please send resume & salary reqmnts. to Director, HR, Compris Technologies, Inc., 1000 Cobb Place Blvd, Kennesaw, GA 30144.

Technical Consultant. 40 hr/wk from 9:00am to 5:00pm. $60,000/yr. Network Administration, software implementation and development, and PC support using DocuTech and OuarkXpress. Require a M.S. degree in Electrical Engineering or Computer Science and one year experience in job offered or as Network Administrator or Management Methods Analyst using DocuTech and QuarkXpress. Applicants must show proof of legal authority to work permanently in the U.S. Please send resumes to Illinois Department of Employment Security, 401 South State Street-7 North, Chicago, Illinois 60605, Attention: Leila Jackson, Reference #V-IL-23068-J. An Employer Paid Ad. No Calls. Send 2 copies of both resume and cover letter.

Infinite Computing Systems, a Cedar Rapids, Iowa Information Technology and Consulting Firm is looking for highly motivated Systems Analysts, Programmer/Analysts, Software Engineers and Project Managers. Some Senior Level Positions are also available. We are recruiting IT professionals with experience in the following areas:
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* Mainframe systems conversion
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SOFTWARE ENGINEER
Software engineer to design, develop and test computer programs for business applications; analyze software requirements to determine feasibility of design; direct software system testing procedures using expertise in Java, JavaScript, C++ and Oracle. Requirements: Master's Degree or equivalent in Computer Science or related field and two years experience as a software engineer or computer programmer, knowledge of Java, JavaScript, C++ and Oracle. Salary: $91,936/year. Working Conditions: 8:00 A.M. to 5:00 P.M., 40 hours/week, involves extensive travel and frequent relocation. Apply: Mr. Tom Dembosky, Indiana Job Center, 350 N. Fourth Street, Indiana, PA 15701, Job No. WEB132581.

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SOFTWARE ENGINEER
Software engineer to design, develop and test computer programs for business applications; analyze software requirements to determine feasibility of design; direct software system testing procedures using expertise in AS/400, RPG/400, DB2/400 and Query/400. Requirements: Bachelor's Degree or equivalent in Computer Science or related field and two years experience as a software engineer or computer programmer, knowledge of AS/400, RPG/400, DB2/400 and Query/400. Salary: $66,000/year. Working Conditions: 8:00 A.M. to 5:00 P.M., 40 hours/week, involves extensive travel and frequent relocation. Apply: Ms. Barbara Cole, Greene County Team PA CareerLink, 4 West High Street, Waynesburg, PA 15370-1324, Job No. WEB132574.

Senior Software Engineer: Design, develop and implement software systems to determine feasibility of design and directs software testing procedures, programming and documentation. Work involves extensive travel and frequent relocation. Must have one year of experience using SAP. A Master's degree in one of several limited fields: computer science/applications, engineering, chemistry, mathematics, physics or a business related field. Will accept a Bachelors degree, or foreign equivalent, with five years of progressive experience as a computer professional. Salary is $100,000 per/yr, 40 hrs/wk., 9:00-5:00 p.m. Please submit resumes to: Mr. Thomas C. Dembosky, Manager, Indiana Job Center, 350 North Fourth Street, Indiana, PA. 15701-2000 Job Order #: WEB 130550.

SOFTWARE ENGINEER
Software engineer to design, develop and test computer programs for business applications; analyze software requirements to determine feasibility of design; direct software system testing procedures using expertise in ASP, Visual Basic, Crystal Reports and Oracle. Requirements: Bachelor's Degree or equivalent in Computer Science or related field and five years experience as a software engineer or computer programmer, knowledge of ASP, Visual Basic, Crystal Reports and Oracle. Salary: $75,000/year. Working Conditions: 8:00 A.M. to 5:00 P.M., 40 hours/week, involves extensive travel and frequent relocation. Apply: Ms. Sue Notarnicola, Fayette County Team PA CareerLink, 32 Iowa St., Uniontown, PA 15401-3513, Job No. WEB132560.

SOFTWARE ENGINEER to design, code and develop web-based application software databases using ASP, HTML, XML, Cold Fusion, CGI, Story Server, PHP, Java, Java Script, Java Servlet, VB Script, C, Perl, Rational Rose, TCK/TL, Oracle, Sybase, MS SOL Server, PostgresSOL and MYSQL under Linux, UNIX and Windows NT operating systems; Mentors junior programmers. Require: Master's degree in Computer Science, Computer Information Systems, or a closely related field. Must have a demonstrated ability to perform stated duties through previous work experience/academic coursework and projects. Salary: $63,450 per year, 9:00 am to 6:00 pm, M-F. Apply by resume to: Kristina Ulveling, VP - Human Resources, Macquarium, Inc., 1800 Peachtree St., NW, Suite 250, Atlanta, GA 30309; Attn: Job YW.

Informix Database Administrators
Install and maintain company Informix database systems. Requirements include bachelor's degree in computer science, business management science, MIS or related field and experience with Informix systems. Must be certified in Informix. Submit resumes to Bob Allen, VF Services, Inc., P.O. Box 21488, Greensboro, NC 27420-1488.

SOFTWARE ENGINEER
Software engineer to design, develop and test computer programs for business applications; analyze software requirements to determine feasibility of design; direct software system testing procedures using expertise in ASP, Visual Basic, Crystal Reports and Oracle. Requirements: Bachelor's Degree or equivalent in Computer Science or related field and five years experience as a software engineer or computer programmer, knowledge of ASP, Visual Basic, Crystal Reports and Oracle. Salary: $82,000/year. Working Conditions: 8:00 A.M. to 5:00 P.M., 40 hours/week, involves extensive travel and frequent relocation. Apply: Mr. James J. Mackin, Beaver Falls Job Center/TPCL, 2103 Ninth Ave., Beaver Falls, PA 15010-3597, Job No. WEB132595.

SOFTWARE ENGINEER
Software engineer to design, develop and test computer programs for business applications; analyze software requirements to determine feasibility of design; direct software system testing procedures using expertise in Java, JavaScript, C++ and Oracle. Requirements: Bachelor's Degree or equivalent in Computer Science or related field and two years experience as a software engineer or computer programmer, knowledge of Java, JavaScript, C++ and Oracle. Salary: $135,200/year. Working Conditions: 8:00 A.M. to 5:00 P.M., 40 hours/week, involves extensive travel and frequent relocation. Apply: Mr. Terrance Kinney, Armstrong County Team PA CareerLink, 1270 North Water Street, PO Box 759, Kittanning, PA 16201-0759, Job No. WEB132592.

Senior Software Engineer (multiple openings): Design, develop and implement computer software systems using PeopleSoft and related software. Work requires extensive travel and frequent relocation. Must have 1 year of experience using PeopleSoft and related software. A Master's degree in one of several limited fields: computer science/applications, engineering, chemistry, mathematics, physics or a business related field. Will accept Bachelors degree, or foreign equivalent, with five years of progressive experience. Salary is $100,000.00 per year, 9am – 5 pm. Send resumes, referencing Job Order WEB 130541, to Mr. Terry N. Faust, Manager, Washington County Team PA CareerLink, Millcraft Center, Suite 150LL, 90 West Chestnut Street, Washington, PA 15301-4517.

SOFTWARE ENGINEER
Software engineer to design, develop and test computer programs for business applications; analyze software requirements to determine feasibility of design; direct software system testing procedures using expertise in DB2/400, RPG 400 and Query 400. Requirements: Bachelor's Degree or equivalent in Computer Science or related field and five years experience as a software engineer or computer programmer, knowledge of DB2/400, RPG 400 and Query 400. Salary: $70,200/year. Working Conditions: 8:00 A.M. to 5:00 P.M., 40 hours/week, involves extensive travel and frequent relocation. Apply: Mr. Anthony Gebicki, Westmoreland County CareerLink, 300 East Hillis Street, Youngwood, PA 15697-1808, Job No. WEB132572.

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Attn: Michelle Beaumont

Technical Consultant: design, develop, test & document business software systems in accord with client specifications for various platforms such as MS DOS, MS Windows & Macintosh. Perform software design utilizing software methodologies to obtain a streamlined & quality focused development & implementation process. Perform software development using C/C++, PowerBulider, Integrated Development Environments & Compilers. Integrate object oriented analysis & design, client server development & cross platform portability into the software development process. Gather client specifications, perform software requirements analysis & design software systems to serve client business needs. Develop software system testing procedures & create programming documentation. Give client presentations to instruct & train clients/users on the recommended software system. Serve as client liaison throughout lifecycle of the project. Some projects may be performed at client sites in various geographical locations requiring travel to &/or temporary placement at a client site. Must have Bachelor's degree in Computer Science. Must have at least two years of experience in the job offered or as a Software Engineer. Experience as a Software Engineer must include 1) software requirements analysis & design; 2) software development using C/C++ & 3) development of software system testing procedures & creation of programming documentation. Resume required. 40 hrs/wk, 8:00am - 5:00pm. $69,700/yr. Overtime required as needed at $33.51/hr. Applicants must show proof of legal authority to work in the U.S. Send resumes to the ILLINOIS DEPARTMENT OF EMPLOYMENT SECURITY, 401 South State Street - 7 North, Chicago, Illinois 60605. Attention: Brenda Kelly, Reference #V-IL 23412-K. AN EMPLOYER PAID AD. NO CALLS - SEND 2 COPIES OF BOTH RESUME & COVER LETTER.

Programmer Analyst (Micro/Web) - Multiple Openings
Structured systems analysis, design, development, testing, quality assurance, implementation, integration, maintenance and support of integrated client-server based systems for business, financial, banking, manufacturing and other commercial business application systems in a multi-hardware/multi-software environment using centralized or distributed relational database management systems, 4GLs (Fourth Generation Languages) and other GUI (Graphical User Interface) front-end tools. Analysis, design and development of client-server applications using object-oriented methodology. Bachelor's Degree (or equivalent) in Computer Science-Math/Engineering/Science/Business-Commerce and 1 yr. experience in job offered or as Software Engineer/Systems Analyst are required. Must have appropriate combination of skills as follows: 1 of A and 2 of B; or 2 of A and 1 of B; or 3 of A. A includes Oracle, Sybase, Informix, SOL Server, Progress, Ingres, Access and Proxy Server; and B includes PowerBuilder, Visual Basic, MS-Windows, Visual C++, JAM, APT-SOL, SOL*FORMS, ESOL/C, GUPTA SOL, Progress 4GL, Informix 4GL, Ingres 4GL, C, Java, Lotus Notes, HTML, CGI, IIS, ASP, Front Page, Perl and Java Development Kit (JDK); High mobility preferred. 40 hrs/week, 8 am - 5 pm. $53,098 - $75,000 per year. Qualified applicants should contact or send resume to Mr. Anthony Gebicki, Manager, Westmoreland County CareerLink, 300 East Hillis Street, Youngwood, PA 15697-1808. Refer to Job Order # WEB 130525.

SOFTWARE ENGINEER - Must have BS in Engineering. Must have 1 year experience in offered position or 1 year experience as Software Developer or Related. Research, design and develop computer executive software verification plans in conjunction with hardware product development for the automotive electronics manufacturing industry using C language on UNIX system. Formulate and design software system using scientific analysis and mathematical models to predict and measure out-come consequences of the design using computational methods. Execute desk and bench checklists using circuit theory and measurements. Develop and execute software functional tests based on instrument design. Analyze software requirements to determine feasibility of design within time and cost constraints and document software test results using Microsoft Word and Excel. Develop automated software test tools, procedure programming and documentation using Microsoft Office applications. Support response team testing using engineering analysis. Compare software modules for different products, code review on safety software products using takeoff tools from UNIX. Develop and execute test cases to verify software for sensor diagnostic modules using C and UNIX version control tools. 40 hours per week, 8:00 am to 5:00 pm. Qualified applicants send resumes to Janae E. Wilkinson, International Human Resource Manager, Delphi Delco Electronics Systems, One Corporate Center, Kokomo, Indiana 46904-9005.

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Users Vent Frustration Over Oracle CRM/ERP Upgrades

'Not ready for prime time' among complaints at conference

BY MARC L. SONGINI
HONOLULU

ORACLE USERS last week expressed frustration over problems with upgrading to Oracle's new E-Business Suite 11i software.

During sessions at the Oracle Applications Users Group (OAUG) conference here, attendees complained about a lack of reliable information about the status of the applications, a flurry of bug-fix patches, malfunctioning modules and the difficulty in getting help from Oracle Corp.'s customer service organization. Several attendees said Oracle has released about 5,000 patches that for 11i.

The software "is not ready for prime time," said Donna Rosenstrater, an OAUG board member who works at San Jose-based electronics contract manufacturer Sanmina Corp.

The 11i suite, which became fully available in May, is the latest version of Oracle's Web-based enterprise resource planning (ERP) and customer relationship management (CRM) applications. Oracle plans to stop offering free customer support on most of its earlier releases at the end of next year, which means users will have to upgrade or pay extra for support.

Long Time to Upgrade

Karen Gilbert, an OAUG director who works at Dallas-based consulting firm Computer Systems Authority, said the general rule of thumb among users is that it takes about seven days to go live with 11i, whereas most companies typically have just a weekend to implement an upgrade.

Gilbert also claimed that Oracle's own support staff hasn't been properly trained on the workings of the 11i suite.

Oracle's applications unit needs to start performing triage by stopping new-product development work and focusing resources on helping users get through their upgrades, she said.

Not all user experiences have been negative. The new installations seem to be going more smoothly than the upgrades, said observers.

For example, Pella Corp., a window and door manufacturer in Pella, Iowa, went live with 11i's financial modules after spending 17 weeks installing the software.

"Slowly but surely, we're rolling out 11i," said Pella Vice President and CIO Steve Printz.

Jeremy Burton, senior vice president of products and services at Oracle, said only 43 companies have gone live with 11i applications thus far.

But, he said, it doesn't take as long to implement the new Oracle applications as it does to install ERP systems from rival vendors.

Any new application release is bound to have bugs, Burton said, but he described the 5,000-patch figure cited by OAUG attendees as too high. While he wouldn't disclose a specific total of patches, Burton said Oracle has "a huge services organization geared up to help solve these problems" during migrations.

Oracle's Appsnet online community is one venue where users can share migration tips and other information, said Burton. ▶

OAUG

the idea out of fear of losing their independence. So Oracle announced that it would launch its own user show in February, called Oracle ApplicationsWorld. CEO Larry Ellison rationalized the move by saying that "choice was a good thing."

But choice is exactly what some OAUG members claim is being taken from them. They said they fear that the primary purpose of an Oracle-sponsored show is for sales and marketing and that there would be less open dialogue and criticism. Moreover, they said, such a show would be targeted at potential new users, sacrificing the needs of Oracle's installed base.

"We are a captive audience to some extent," said Dianne Waldman, financial system liaison director at DreamWorks SKG, a Glendale, Calif.-based entertainment company. "We spend millions to get up on Oracle. It's not like I can pick up tomorrow and say, 'See ya, Larry; I'm going to PeopleSoft.' I feel they're taking advantage of that. We feel trapped and captive and helpless."

Ron Wohl, Oracle's executive vice president of applications development, said last week that users can choose which conference they want.

But, he added, Applications-World would be the "focus of Oracle's attention, including development, support consulting and education." He said Oracle is talking with the OAUG to come to some sort of agreement for a single show.

Not everyone has such a hostile view of Applications-World.

"I don't see this as a shirking of the user group," said Jeffrey Shepard, vice president of Cap Gemini Ernst & Young U.S., a Cleveland-based consultancy and Oracle partner. ApplicationsWorld would exist as another forum for Oracle users, like the SAP AG-sponsored conference, Sapphire. He said some users are just nervous about change.

Fears of Devastating Change

However, one software exhibitor at the OAUG conference who asked to remain anonymous said such change could be devastating. She said Oracle representatives indicated informally to her that the company preferred its partners' allegiance be with ApplicationsWorld, and she doesn't plan to attend the next OAUG conference.

"ApplicationsWorld could kill the OAUG conference." she said.

At the show last week, there were significantly fewer Oracle employees present than in previous years — down from approximately 800 at last spring's conference to 100 — and though Oracle did present a mini-theater, missing were

(large quotation mark graphic)

We feel trapped and captive and helpless.

DIANNE WALDMAN, FINANCIAL SYSTEM LIAISON DIRECTOR, DREAMWORKS SKG

the technical panels, educational workshops and other support programs that Oracle had previously sponsored. Users faced with the thorny problems of migrating to Oracle's new E-Business Suite 11i found this particularly unpleasant.

"They need to pay attention to the end user who flew all the way out here," said Pamela Sheehan, an OAUG procurement committee co-chairman. "Oracle is delivering a product that is buggy, and [users] want answers to questions."

Gail Wallin, senior business analyst at Dartmouth College in Hanover, N.H., agreed, adding that the OAUG conference is different from ApplicationsWorld. "This [conference] is more geared for the user, not to the [vendor]. If I had no other choice, I would go [to ApplicationsWorld]. But it's not the way I wanted it. They would be taking away the right for me to go where I want."

At a user forum last Tuesday, one anonymous customer expressed frustration about the drop-off in Oracle employees' attendance at the conference.

"Does Oracle listen to its customers?" the user asked, drawing applause from about half of the several-hundred-strong audience.

Some OAUG members looked askance at a party last week hosted by an Oracle partner at which free tickets to ApplicationsWorld were offered as prizes. They said they feel that this violates, at least in spirit, the regulation that Oracle won't recruit for its own show at OAUG's conference.

However, Oracle claimed that it's not in competition with the OAUG and has done nothing wrong.

Mark Jarvis, senior vice president and chief marketing officer at Oracle, pointed out that the OAUG represents only about 15% of Oracle's installed base.

"You're talking a small minority of our customers," he said.

And while some users said they feel that the OAUG conference is in peril, the OAUG board is confident that the organization itself remains strong. Jeremy Young, president of the OAUG, said that in the long run, ApplicationsWorld isn't going to be a threat. "OAUG has a value proposition in terms of independence and user-to-user networking which will continue into the future," he said. "We look forward to working with Oracle." ▶

FRANK HAYES/FRANKLY SPEAKING

Beating IT age bias

IF YOU'RE AN IT WORKER OVER 40, you're 16% more likely to lose your job than a younger IT worker. It will take you 21% longer to find a new job than a younger applicant, and it will be 25% harder just to get an interview. And when you finally get that new job, you'll typically take a 13% pay cut. That's what a new study by the National Academy of Sciences says — though the researchers balk at admitting there's age discrimination in IT. No sir, lieutenant, we're not sure it's murder; all we've got is a dead guy with a dozen stab wounds in his back. Maybe it's suicide — or even just coincidence.

The study — you'll find a link to it on the Web at *www.nas.edu* — was commissioned by Congress in 1998, when lawmakers were raising the annual limit for H-1B guest-worker visas from 65,000 to more than 100,000. (This month, Congress raised the cap again, to 195,000 for the next three years.)

Maybe we can't blame the researchers for not drawing the obvious conclusion that there is discrimination against older IT workers.

After all, age discrimination is a crime — and this is supposed to be a report on the U.S. IT workforce, not crime. More than that, it's a report to a Congress that's a lot more enthusiastic about jacking up the number of guest workers than doing much about IT age bias.

So Chapter 4 of "Building a Workforce for the Information Economy" concludes that "the data available to the committee are insufficient to establish either the presence or the absence of age discrimination."

Those longer percentages for over-40 IT workers might be due to personal choices or simply shifts in the industry, the researchers write.

But the rest of that chapter in the report is a damning summary of data showing something most IT people know and most employers deny: Older IT workers regularly get shafted.

Is that something this business should be ashamed of? Sure. But don't expect any tears for over-40 propellerheads who face age bias. That just won't happen.

And don't expect IT employers to quit asking for more and more fresh-from-school kids and IT guest workers for jobs they claim that older IT people can't fill.

So if you want to beat IT age bias, you'll have to do it yourself. How? Don't stand still. Don't stop learning. And don't let yourself be steamrolled by change, age bias or anything else.

That means you can't just do your job and keep current in your specialty. Your specialty may not exist two years from now. Your employer may not exist by then, either. And if you expect your may-not-exist employer to invest in your may-not-exist specialist knowledge, you're dreaming.

So keep cranking your brain around to what your next job will require. That means making sense of the Internet, e-commerce, dealing with customers instead of just users, serving up better and more secure data to people who never wanted it before in ways they never needed it in the past.

How do you fit into that future? What do you have to do to fit in?

Broaden your base. Experiment with a Web page. Dabble in databases. Figure out XML. Teach yourself Java or Perl or JavaScript. Set up a Linux network built from thrift-store PCs. Dip a toe into everything you can learn on the cheap.

Hands-on experience won't guarantee you a new job if you're suddenly on the street, but you never know what piece of knowledge will tip the balance in your favor.

Don't wait. Start now. Because the percentages are against over-40 IT workers — and if you don't beat those percentages, you'll feel like you've been stabbed in the back. ▶

If you want to beat IT age bias, you have to do it yourself.

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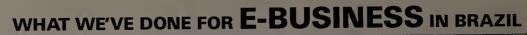
The 5th Wave

"Our automated response policy to a large company wide data crash is to notify management, back up existing data and sell 90% of my shares in the company."

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We're lighting that campfire, Don, by building the new, high-performance Internet – the Local Internet. Bringing the speed, reliability and capacity of the Optical Internet closer to business networks. By not only shattering the band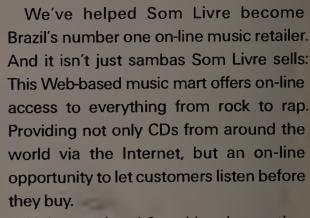width bottleneck, but also with an industry-leading portfolio of Local Internet solutions that offers next-generation capabilities, processing power and intelligence. Enabling service providers to deliver and manage – whether wired or wireless – profitable new eBusiness applications and services. So come together, right now with Nortel Networks™. And make the Internet whatever you want it to be. nortelnetworks.com

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